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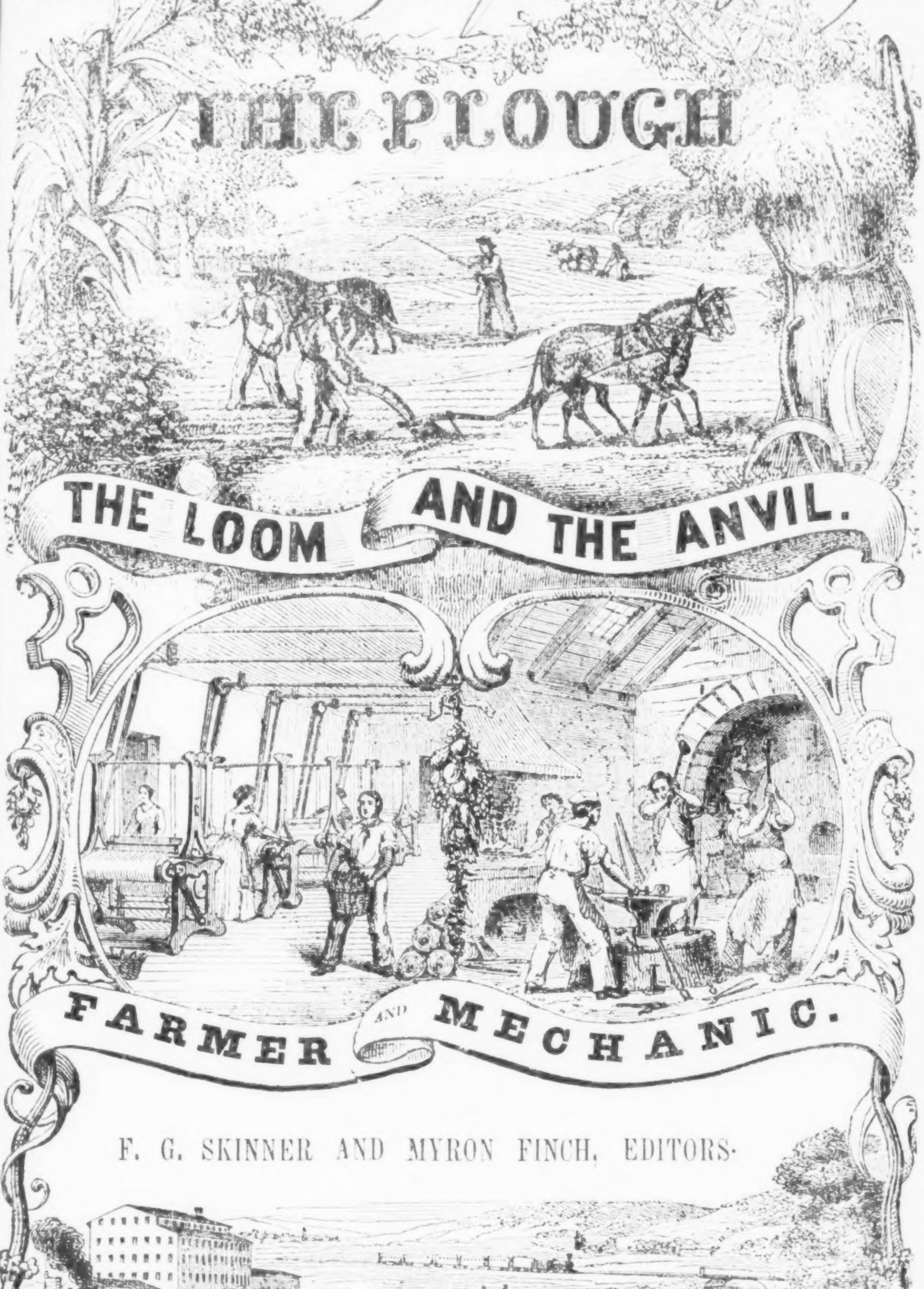

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The Plough, the Loom, and the Anvil.

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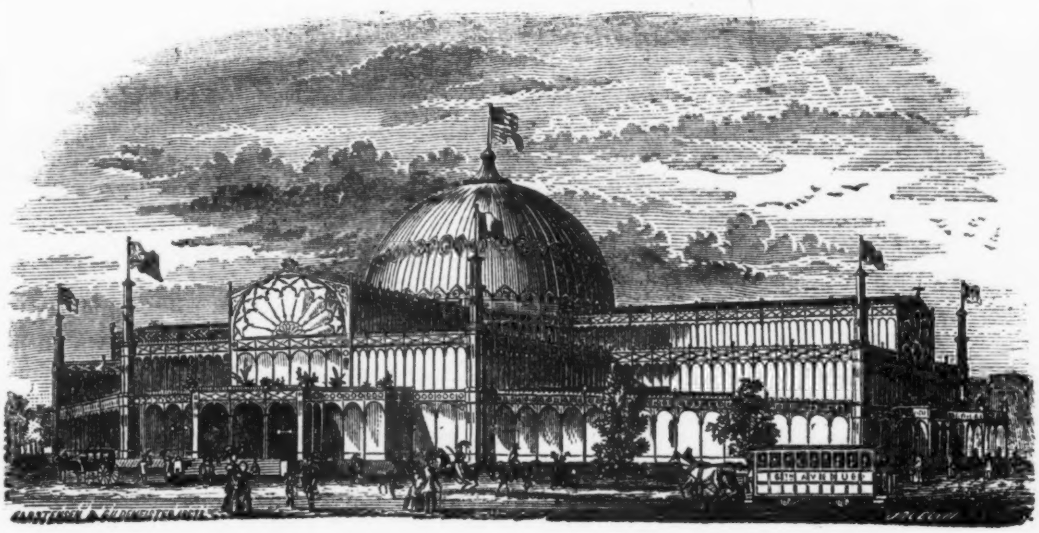


THE AMERICAN EXHIBITION OF 1853.

OUR readers have doubtless already become well informed of the projected Industrial Exhibition which is expected to be held in the city of New-York during the present year. Of its arrangements and details information has been extensively published, and will from time to time be given in our pages. The engraving represents the building in which the Exhibition is to take place.

The great Exhibition of the Industry of all Nations, which formed the remarkable fact of the year 1851, was an event of vast and untold importance to the world. It was the first distinct and glorious premonition, on the part of the nations as such, of the on-coming of the reign of Peace. Nations which had not only learned, but taught the art of war as the one great object of human government—which had considered conquest as the legitimate trade of nations, in obedience to the law of might as opposed to the eternal rule of right—those nations which had desolated and been desolated in turn, by the alternating tide of a bloody fortune—actuated by a new and lovelier impulse, hastened to meet each other in a more sacred field. The arts of peace—the indices of civilization and prosperity, the radiant sisterhood of influences which lead to the holy fraternity of man—erected the most splendid altar upon which the sun ever shone; and upon it were laid the countless and inestimable offerings of a hopeful world.

It was an inspiriting and sublime scene. From the frozen plains of the

dreary north to the spicy groves of the genial south—from the golden sands of California, around the world, over plain, and sea, and island—from quiet vales and rough mountain heights—from the crowded mart and the silent cottage of the peasant, there came up to the densely crowded avenues of the magnificent temple, the varied contributions of the industry of the world. It was a gorgeous epitome of human history—the most radiant page in the records of humanity, and the noblest tribute to the spirit of a better day.

The results of that Exhibition were great and lasting. One nation learned, and another caught the spirit of a truer civilization, and another awoke from its long-age lethargy. It was the first, but it will not be the last, of such art-jubilees.

We sincerely hail the enterprise which will soon become a prominent topic of interest to the people of the United States. Its occurrence now is opportune, and of its results we hope we shall be able to speak hereafter in the most emphatic manner. The improvement of every branch of industry, the development of our resources, the stimulating of a spirit of refinement among our people, we hope will be but the necessary consequences of this Exhibition.

American mechanics have every reason to enlist in this enterprise with the highest enthusiasm. Doubtless some of the best productions of the Old World will be sent to the American Fair, for the very purpose of demonstrating to the American people the superiority of the foreign over the domestic article. The rich and elegant fabrics of Europe will be exposed to the gaze of the visitor, along with the splendid trappings and tinsel which form the externals of the society of the Eastern world. Placed alongside of the less pretending specimens of American skill and refinement, these will glitter and dazzle, while those will just as certainly bear off the palm for their practical and economical value. In one splendid glass-case, watched with eagle-eyed jealousy, there stood in the Crystal Palace a gem which was the booty won by the robber-hand of the so-called Christian warrior from an Indian prince. In a side avenue there was a large unfilled area, appropriated to American Exhibitors. Like a lumber-loft, compared with some of the other apartments of the Palace, a meagre supply of vehicles, agricultural implements, and field-products, caused a general feeling of contempt for the people of the "Model Republic." But the trial came, and the rough and singular machine in one corner is brought out before some of the leading men of the British realm. A few strokes only serve to turn the smile of incredulity and smothered contempt into astonishment; and a brief trial changes astonishment into admiration and unmeasured applause. The highest premium was won by the successful Reaper, and Great Britain has gained enough by the invention to pay the whole expense of the Exhibition, had it not been a money-making concern by virtue of its own interest and attractiveness. That one machine is worth more to her than all the gems ever plundered by her warriors from the weaker nations of the East. The same result followed, in a greater or less degree, in other instances, until for practical value and novelty all the rest of the Exhibition was left with the royal yacht—no where.

Refinement in the arts, by which we include all those departments of industry which look to the construction of elegant and highly finished machinery, tools, and implements of every kind, is desirable for the interest of mechanics themselves, as well as for the country. But we do not attach a very high estimate to that refinement which seeks to introduce mere luxury among us. We believe that all the purposes of a highly cultivated art can

be obtained while an eminently practical value is constantly regarded. This is the view we desire to take of all advance made, and it is the view which alone will meet the wants of our country.

The circumstances in which we have been placed have all served as a drawback upon the cultivation of art. Men who carry the axe upon their shoulder and drive their ox-teams into the forest for the purpose of clearing away the "grand old woods," which boast their patriarchs of hundreds of years, cannot stop to examine and admire the consummate productions of Old World masters. A glance is all that can be given, while possession and rivalry are out of the question. The American people have had a labor to do, which those of Europe have outgrown by centuries of compacted society and centralizing influences. The constitution of the social fabric in Europe has served to develop power in every department—power in the State, power in the Church, power in science, power in art; and all the resources of the human mind have been called into play, to elaborate for these the richest and most magnificent productions of genius and skill. But power, centralizing as it has done, has made the millions tributary to the few, and hence luxury, refinement, and the present highly cultivated state of European as well as Eastern art, have been purchased by the sacrifice of vast multitudes of men for the benefit of the privileged classes.

Population is rapidly increasing in our country. The five millions of 1800 are the twenty-five millions of to-day. The widely extended territory of three millions of square miles is becoming rapidly occupied with villages, towns, and cities. The wilderness springs up in a few years into a densely populated spot, where all the evidences and means of civilization are as necessary and as abundant as in any part of the world. But there is too much to do, there certainly has been too much of a severely practical character to be done, to leave room for the elegant niceties and superior luxuries of artificial society. Nor do we want them, had we the room or the time. There is a continent before and behind us. Far away to the sunset stretches a territory of vast and unbounded resources, capable of sustaining a population of a hundred millions, and inviting us to take possession. It is to be the highway over which the two continents which lie on either hand shall pass and re-pass, and exchange their commodities, when we shall have learned the true secret of reciprocity with the world—or when they shall have learned the true secret of reciprocity with us—the freedom of the millions of the human family. With this labor before us, and the progress of man bidding us onward, let the American worker look forward steadily to the true and lofty purpose of his position, and disregard the attractions of a meretricious refinement and luxury, which poisons and falsifies all pure taste, and adhere simply to the most solid advantages of a practical art.

The American mechanic has much to learn, and much may be learned in obedience to the dictates of a sense of duty, and patriotic devotion to the interests of the country. We have, no doubt, a too selfish aim in all our pursuits. The acquisition of wealth is considered the great end of all business. For that end high and noble considerations, which would assuredly lead to wealth, are often sacrificed. The mechanic, the agriculturist, the artisan, the merchant, and the professional man seem to us to be deficient, and lamentably so, in that *esprit du corps* which should lead each man to honor his calling, and seek to dignify it by every honorable means. Personal ends are too much the only end with us, as with all men, and these narrowing, selfish considerations stultify art, cripple our progress, and blind reason.

A broader and more generous view of the relations of science and the me-

chanic arts with all true art, must yet come to be understood and felt by American mechanics, before we can hope to see our productions, our machinery, and our fabrics, compare with those of Europe. Nor, after all, do we care about imitating, except in the practically useful, the things of the Old World. We can, and we should, build up our own schools. We have the mind, the genius, the taste, the material, and the field, broad and magnificent, far surpassing almost all that has been yet produced in that which immediately concerns man as a moral and social being, and why should we not do it?

The great idea of our art hitherto, and that which we hope ever to see retained as the distinguishing feature of American art, is, practical uses and advantages. The remains of ancient art, rich, beautiful, matchless as they may be, are witnesses of the aristocracy of art, if we may so speak, and the exclusive use of its benefits. The magnificent temples, and palaces, and statues, and triumphal arches, attest the consummate perfection of the artists, but they record at the same time a saddening memorial of the popular degradation. Where such exclusive devotion is paid to ART, and she is made the object of supreme regard, there may be a measure of popular refinement intellectually in the cultivation of taste, but this is far more than compensated for by the corruption of all those sentiments and principles which keep society pure and untainted. If art cannot be cultivated without a sacrifice of the pure and the refined sympathies and influences, which make society lovely and delicious, then it must be left uncultivated. But we believe that this can be done, and that while our art in every department may be brought to the highest perfection, the pure and sacred influences of a holier ideal may dignify and elevate all its labors and its works.

An elaborately wrought statue, which seems as if the lips were but waiting to utter the thoughts revolving in the mind, may be an attractive and fitting evidence of the triumph of the sculptor's art; it may for a moment delight the eye of the beholder; it may serve as a profitable study for the few who would examine it with an artist's eye. In all this there may be a practical value. But what are all the statues, and frescoes, and paintings which have come from the old masters worth, and what are all the models of architecture of the Old World worth to us, or to man to-day, compared with one highly finished steam-engine? What are all the fine arts of the past to us, who have the world in a manner to redeem from the errors, the delusions, and the oppression of the by-gone ages, in which art has only been used as an element in oppression, and made to decorate the scandalous bed and the magnificent tomb of the robbers and despots of old? May not our own day, and our own land, produce a better school, and a more noble spirit—consecrated to a more generous end? Is not one steamboat worth more than the temples of Heliopolis and Thebes? Are not a thousand miles of telegraph wire more inspiring, as a work of consummate art, than the dead-stone creations of a pyramid or a labyrinth? Is not a Hoe printing-press more beautiful, more finished, more wonderful as a piece of high art, than the Acropolis or the Parthenon? Look at one of those complicated machines, as the cylinders fly with instantaneous revolutions, and in the mathematical precision of motion, the beautiful construction, and the harmony of all the parts, you will see a glorious work of ART, to us far more worthy of admiration than a large portion of that which has received the stereotyped approbation of critics and connoisseurs for the last five centuries, as the legacy of the art of the past to the art of the present.

It is well to have an ideal. In our American school of art, bad as the

term may be—or in our school of American art, if it suit the reader better—at any rate, under these western skies, where broad rivers flow, and star-spangled banners wave from the Atlantic to the Pacific—in our land, we say, where liberty is the atmosphere we breathe, and light our pathway, we hope to see a nobler ideal than we have been able to perceive in much of the art of the past age, if in any of it. With the press as the distributing power, we desire to see, on a radiant pedestal, ART and HUMANITY, sister graces, with arms intertwined, as the presiding presences in all our schools. Offerings brought to their shrine, finished as specimens of ART, shall be dignified as gifts to HUMANITY. In an unselfish consecration of intellect and labor and science to the wants of man, as the inspiring motive, so shall our triumphs be more illustrious than all that have reached us from the centres of civilization and art in the Old World.

We contend, therefore, that American mechanics have before them a noble and inviting destiny. Under the influences of free institutions, with the shackles of the past broken, and the power of old and crushing primogenitures in every department defied by the assertion of individual right, the American mechanic is free. We require only a true and universal appreciation of our advantages, to place ourselves in a position most honorable and most commanding. To do this, a more general sense of individual responsibility, and a higher ambition, are necessary. An outgrowth of this sense would be a more earnest spirit of scientific inquiry, and a more thorough education of the working-man. We are too apt to skim the surface. We want to get over too much ground. Broad acres, rather than deep soil, seem to be the aim of the people. Expansion, instead of deep ploughing and subsoiling, is apparently easier. Instead of this, we want scientific mechanics and working-men. Is not the mechanic, studying out his problem, and constructing his new apparatus or engine, which shall by its artistic and scientific beauty and excellences bless and elevate man, as true an artist as though he were delineating the Bacchanalian revels of the old and grossly descriptive fables of the word-painters of all time? Is not the apprentice-boy, calculating his tables, and planning his instruments, and modelling his machinery, as noble an artist as he who with chisel and mallet strikes off the corners of the marble block, and brings out the life-like but ineffective statue? Does not the value of both depend upon the success with which the harmony of proportions, of adaptations, of designs, and of ideals, are realized? Is one an artist because he produces colors on the canvas, or shapes the stone, and the other not an artist because he gives a valuable aid to man in the economies of the world, and supplies something new to meet the wants of man? We shall not pretend now to discuss the questions of art, and wherein the artist consists. But we simply contend that the scientific and intelligent mechanic is a true artist, in all that makes art noble or worthy of admiration and culture.

We hope to see, or at all events we hope the time will come, when such a spirit shall animate the American mechanic. We do not despair of seeing many of our factories and workshops with their libraries, their lyceums, and their debating societies and evening schools. We do not despair of knowing that our mechanics hold the first rank in the scale, and that while World's Fairs shall be held, they may go into them, with the accumulated trophies of successive triumphs, in the race of competition with all the hitherto more favored sons of fortune and of patronage in the Old World. American mechanics have much of which to be proud. From the printer-boy who caught the fire from heaven, to the inventor of the Hoe press, which always causes our heart to beat quick with pride and enthusiasm and hope whenever

we see it, our list of honorable names is long and brilliant. Fulton and Fitch, Rittenhouse, Whitney, Morse, and their compeers, to say nothing of those who lend a lustre to the professional and artistic walks of life, are but evidences of what a cultivated and self-educated body of mechanics may do when they will.

We therefore heartily encourage our mechanics to be prepared for the coming art festival, resolved that it shall be a way-mark in the history and progress of their respective pursuits. Let the spirit of a nobler purpose and a higher end animate our hopes, and nerve our arms, and sharpen our intelligence, until triumph—the triumph of ART and HUMANITY—shall crown our labors with an indefeasible title to the rank of the true artists of the world.

One grand element in the progress of art in the Old World has been *patronage.* The governments have lavished immense sums upon national works, and have often liberally patronized individual artists; titles and patents of nobility have often been bestowed upon the sons of genius, as well as upon the mere court favorites of hereditary dignitaries; nobles and millionaires have expended large sums in the gratification of their taste or their pride; while the Church has borrowed an external lustre and a material prosperity from the adornment of its cathedrals and edifices. Architecture and painting, sculpture and music have been taxed to their utmost resources to furnish their attractions, while the artist has been patronized for the creations of his genius.

In our country, however, patronage must come from a different source. It must depend in a great degree upon the material prosperity of the people. Prosperity must depend upon the just rewards of labor. Just as the arts have declined in those countries which have been their ancient cradle, with the declension of material prosperity, so the obstacles to this prosperity must act as a formidable if not insurmountable obstacle to the advancement of the arts in our country where and while they exist. The more labor we perform, and the more of our labor we sell to foreign nations or in our domestic markets, the greater will be the rewards of labor. Hence, whatever will stimulate production in every department, agricultural, mechanical, artistic, and intellectual, must have a beneficent influence upon the refinement of the people. This will, as a matter of necessity, react upon its source, and thus there will be a contemporaneous advance in social and civil prosperity, refinemement, and culture.

We believe that these ends will be more truly reached by regarding our country and its interests, our own citizens and their interests, as of first importance. We have no more moral right to squander our national resources, because a benignant Providence has placed them in our hands, than we have to be reckless of our individual resources. The prodigal learns too late that he has been unwise, and it may be true of a nation as well. The legacy received by the squandering heir will not always last, though his children afterwards may make their own fortunes. So one generation may squander bounteous gifts, which the next may gather again, and find itself at its close where it would have been at its beginning, had its predecessor been wise. A national disaster and a general commercial revulsion throw back prosperity ten or fifteen years. Blood flows quick in fever, but the system is always the weaker for the attack. So a false and temporary prosperity of speculation and excitement leaves the nation weaker than before. The true development, therefore, of our interests and resources, by a well-remunerated and progressively advancing production, depending upon the harmonious and reciprocal

action of all our citizens, is the surest means for securing the culture of the arts in the United States. Patronage will not come from the few of large means, but will follow from the general and popular distribution of the rewards of labor. Whoever desires to see the arts advance in our country, must expect to see that result spring out of the prosperity of the people.

ATMOSPHERIC RAILWAY.

We have recently alluded to a new railway of this description now in operation in France. It will be acceptable to our readers, no doubt, to know not only of its success, but of the manner of its action; and we have condensed the following account from the letters of a correspondent of one of our exchanges, the *Ohio Journal:*

One of the greatest curiosities in a mechanical way which I have met with in my travels, is that of the Atmospheric Railway at St. Germain, about fifteen miles from Paris. Atmospheric pressure has here been adopted to propel trains of cars for a distance of five miles and nearly a half—the last half of which has an ascent of three and a half per cent. This ascent was too great to be overcome in all weathers by a locomotive, and indeed only one locomotive has been found sufficiently powerful to draw a train up at any time.

The system in use in the United States on inclined planes, of drawing trains up and letting them down by means of a rope, has been found here, as elsewhere, too troublesome, too slow, and attended with too many accidents, to be found available on suburban roads where the travel is so great.

An iron tube is laid down in the centre of the track, which is sunk about one third of its diameter in the bed of the road. For a distance of about 5,500 yards the tube has a diameter of only $1\frac{3}{4}$ feet, the ascent here being so slight as not to require the same amount of force as is required on the steep grade ascending to St. Germain, where the pipe for a distance of 3,800 yards is 2 feet 1 inch in diameter.

The manner of applying the atmospheric pressure to the propulsion of the train is exceedingly simple. The air is exhausted from the entire length of the tube, so as to produce a perfect vacuum, just before the arrival of each train, (which is every half hour,) by means of powerful and beautiful engines, somewhat resembling those at Fairmount. These engines are placed—two of two hundred horse-power at St. Germain, and one each at the towns of Neuterre and Chaton, in the valley towards Paris.

To each engine is adapted two large cylinders, which exhaust fourteen cubic feet of air per second. The pressure in the large air caldron (chaudière) attached to the exhausting machines is equal to six absolute atmospheres. It will be readily understood that when this long tube is completely exhausted of air, if a piston so nicely adjusted to the size of the tube as to render it air-tight is allowed to go loose at one end, it will rush through to the other end to fill up the vacuum. To apply the motive power, therefore, to the propulsion of the train, it is only necessary that this piston be attached to the train of cars in such a way as to drag them along after it.

This was the great difficulty to encounter; but so admirably and so simply was this overcome, that the engineer assured us that an accident of any kind seldom ever occurred. Throughout the entire length of the tube, a section

is made in the top, leaving an open space of about five inches. In each cut edge of the section there is an offset to catch the edges of a valve which fits down upon it.

The valve is made of a piece of sole leather half an inch thick, having plates of iron attached to it on both the upper and corresponding under side, to give it strength to resist the suction of the vacuum, which are perhaps one fourth of an inch in thickness. They are not quite as wide as the leather, but wide enough to touch the offset in the suction.

The plates are about nine inches long, and their ends, above and below, are placed three quarters of an inch apart, forming joints, so as to give the leather valve pliability, and at the same time firmness to resist the powerful atmospheric pressure which is brought to bear on it when the air is exhausted. The entire length of the valve, from one end of the tube to the other, is attached to one side, like a cellar door, for example.

From the back side of the piston, a strong iron rod passes up through the aperture which is made by raising up the edge of the valve, and is attached to the bottom of the foremost car. As fast as the piston passes along, the valve is released from the pressure behind it, the loose edge is liberated, and the bar of iron which is attached to the car a foot or more behind the piston, meets with no obstruction to its passage.

The pressure of the atmosphere on the valve in front of the piston, where the vacuum still exists, is so great that there is no danger of the bar of iron exerting pressure so far forward as to loosen the pliable valve; but to render the matter more certain, and to obviate all doubt, a slide on the bottom of the car slips along on the iron plate of the valve over and in advance of the piston, and presses firmly down. Every part of the tube is kept well oiled. The rate at which trains ascend varies from fifteen to twenty miles the hour, according to the load.

When we went up, there were six cars very well filled with passengers. After the ascent commences, two bridges across the Seine, and one viaduct of twenty feet high, and wide arches, are crossed, and one long tunnel through the brow of the hill and under the King's Terrace is passed, where the road is parabolically curved.

The road has now been in operation five years; and so safely and so well has it worked, that the experiment is regarded as entirely successful. The cost of the entire machinery was eleven millions of francs. The cost of working it, or the dividends which the road pays, I did not ascertain.

PERSPECTIVE DRAWING.

Who is there who never tried to draw the figure of a house? Who that has not often wished to place on paper views which excited intense pleasure, while the thought, "I cannot draw," put an end, instantly, to all such "foolish fancies"?

There are many occasions in which one may wish to present a plan for the consideration of others; it may be a house, or a block, or a street; but he "can't draw." He desires to give to the public a representation of some of the contrivances about his farm; as a barn, a pen for swine, a hen-house, &c. But can he draw? There is now lying on our table a representation of a row of stalls for cattle, by an editor of no small pretensions, which no one would guess to be what they are intended to represent. The witty draftsman

declares himself as skilled only in drawing babies in a willow basket, and thus passes off his failure with a jest. The joke is in truth far better than the drawing, and perhaps makes amends for the lack of artistic skill. But we should rather appear respectable in both, if quite convenient.

A week devoted to the acquisition of this art would give all necessary facility for the representation of common rectilinear objects. Curves require much practice ere they can be drawn accurately. But even these are not insurmountable for those of only ordinary tact. And we promise even such, if they will devote an hour or two to each of our short articles on this subject, carried on as we now propose to do, that they shall, at the last, have acquired all that is necessary for the purposes described. We do not mean that they will exhaust even that department of the subject. To draw well, in the highest sense of the term, is a study of years. But the power of giving fac-simile representations of an indefinite variety of rectilinear objects is thus attainable. And we invite all our readers, yet unskilled in this department, fathers, mothers and children, to sit down together at their table, these long evenings, and *practise together* in the manner we may point out.

Certain principles lie at the foundation of this art, which are easily understood and applied. The technical terms employed are few in number, and almost explain themselves.

There often are complexities involved in a crowded picture which occasion much trouble to one not thoroughly versed in the art; pictures presenting circles, ellipses, arches, &c., in perspective and other kinds of lines, which, after a practice of years, will require great care. But fac-similes of an indefinite variety may be drawn on paper, with comparatively but little previous study or practice. We shall present the subject after a plan of our own, having reference, of course, to the supposed circumstances of the reader, who is often limited in the time he can devote to it, and limited also in his facilities for obtaining explanations or elucidations of the various principles of the art, which might be otherwise more concisely treated. But we shall generally suppose that all know how to draw perpendicular and parallel lines, and the like, for these problems are found in almost all our manuals of arithmetic, and are always accessible. Sometimes, however, we shall give directions even on these familiar problems.

Among the more obvious principles and assumptions connected with this art, are the following:

1. The lowest horizontal line of a picture is called the Ground Line.

2. Somewhere above this ground line, and parallel to it, is the Line of the Horizon. The position of this line must depend upon circumstances, as will more fully appear hereafter. It is obvious, however, that the higher your own position above the plane of the picture, the higher, that is the more distant from the ground line, is the horizon. A man at mast-head can see further than a man on deck.

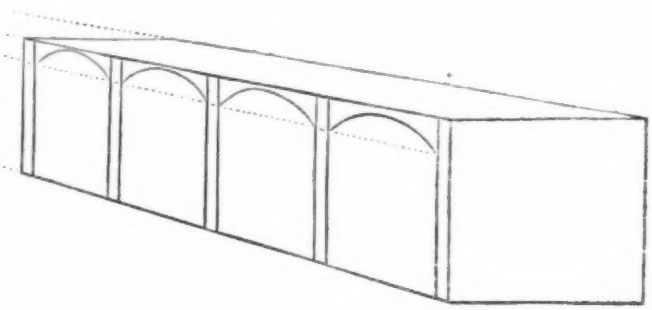
3. Again, notice a phenomenon which our readers must often have witnessed. In looking down a long, lighted street, in the evening, the lamps on the oppposite sides of the street seem to approach each other, as their distance from you increases. If the street were long enough, and straight, they would appear to meet.

What is true of points, represented by these lamps, is also true of lines. The further they are extended from you towards the horizon, the less is their apparent distance from each other. Standing in a car, if you look along the track, and notice the appearance of the rails, you will fully appreciate our assertion.

Surfaces are subject to the same law. Thus the buildings on the side of the lighted street decrease in apparent size, as their distance from you increases. As the width of the street decreases, so does the height of the buildings, and both in the same ratio.

Notice the figure in the margin. This diagram may represent a simple structure extended a considerable distance. The perpendicular lines plainly denote equal divisions, although they are drawn, in fact, on paper, at constantly decreasing intervals. A glance at its proportions indicates that in height, breadth, and depth, it is gradually decreasing as its length increases.

Diag. 1.



You may call these surfaces the boundaries of a street, which has a roof upon it. Other streets may be laid out parallel to it, or branching from it; and all these, of course, as to their several dimensions, must be governed by the same law. Trees, rivers, and all animated objects, seen along these lines, are alike subject to it.

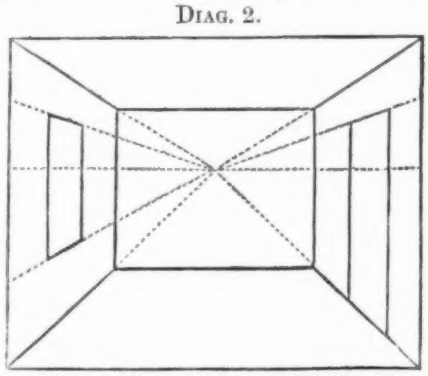
Hence it follows, that all landscapes must be drawn in accordance with this universal truth, or they will not appear as in nature.

Were the oblique lines bounding the sides of this building continued to a given distance, they and the surfaces which they bound would all seem to vanish in one point; and that point is the Vanishing Point.

It is obvious also that these lines do in fact meet, on paper, at a given point, usually within the picture, as in the second diagram, and this point *on the picture plane* is called the Point of Sight. It is the point where a line from the vanishing point on the actual horizon to your eye cuts the picture plane, and is the point where the dotted lines meet on the second diagram. All horizontal lines meet, on the picture plane, at the point of sight. Apply a straight edge to those of our first diagram, and you will find this law verified.

Now let us all apply our hands to another practical test of this principle. Get your slates and pencils, or paper, &c., and see what we can produce. Go, step by step, just as we direct. First, then, draw a square, all of its sides being about four inches long. Secondly, make a very small dot or a point with your dividers, if you have them near, but a little above the centre of this square. Next draw lines from the two lower angles, towards this point near the centre, about $1\frac{1}{2}$ inches long, (which here we have continued to the centre point, merely to show their true position,) and unite the extremities of these lines by another, which must, of course, be parallel to the bottom of the square. On this line, as a base line or bottom line, complete an inner square. That is, draw two perpendicular lines for sides, which must be *continued* (extended) till each

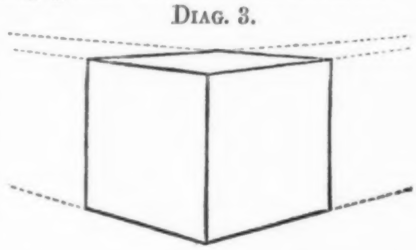
Diag. 2.



outs another line drawn from the *upper* angles of the square, towards the same point near the centre, and then unite these two perpendicular lines by a line parallel to the upper side of the square. You now have two squares, one within the other, united by lines which join the angles of one to those of the other, and all these last or connecting lines, if continued, would meet at the same central point. If you then draw three or four or more lines along the two sides of these squares, joining them still more frequently, all of which must run as if radiating from this same centre, you will have a more obvious representation of a room, with its walls, ceiling and floor, into which you are looking from without, through an open side. That central point will either disappear, or seem to be some object seen at a distance, beyond that which you have been calling into being. You can add windows, &c., by and by, to make the representation still more closely represent some original.

4. While all oblique lines (that is, lines not drawn parallel to the ground line, nor perpendicular to it) must meet on the horizon at the vanishing point, sometimes there will be two vanishing points on the same horizon.

DIAG. 3.



Thus, each of the faces of the cube in the margin are bounded by two oblique lines, which come to a point on the horizon, and two which are perpendicular. But the oblique lines meet on the opposite sides of the figure. A mere glance will show, in all cases, whether the problem before you requires one or more vanishing points.

By drawing a series of squares, or triangles, or other forms, and selecting different points behind, above, or oblique to each, as vanishing points, you can represent objects with a variety of forms at pleasure.

TRUE AND FALSE SCIENCE.

It is popular in certain quarters to decry learning of every form. With this class nothing is admitted authority but "experience;" and this "experience" is generally and almost exclusively the experience of the uneducated. These place themselves in circumstances where it is next to impossible for them ever to make useful progress.

But there is another class who would decide every thing by the symbols of the mathematician, or at least in the study of the learned. We think these quite as far out of the way as the other class. No man shall claim a higher respect for science or scientific men than do ourselves. In its proper sphere its utterings are beyond controversy. The demonstrations of geometry and algebra, the results of all mathematical calculations, rightly conducted, and having immediate relation only to their own symbols and modes of expression, are to give place to nothing short of the undeniable voice from heaven; and these two never can be opposed to each other. So, in all matters of taste, cultivation gives actual superiority, and should secure respect.

But when theory puts off her robes, and mixes in the dust and turmoil of practical life; when she comes into our fields, our workshops, or our kitchens, or undertakes to run on our railroads, we would rather have one experiment resulting in actual success than a dozen plausible theories. In other words, all

practical sciences demand the endorsement of actual experiment before their *dicta* are at all reliable.

Let us illustrate our meaning. The mere physiologist or anatomist tells us that the muscles of the chest are larger and stronger than those of the neck or the arms, and hence all burdens should be carried on the shoulders, rather than on the head or on the arms. But go out into the street, and we have the *demonstration of the senses*, that many burdens can be carried on the head, *all things considered*, better than in any other manner. Again, some nations attach the weight to be drawn to the head of the ox, rather than to his shoulders. We are sometimes doubtful whether this is always bad policy. What tremendous power there is in the head and horns of a mad bull! How strong and thick is that muscle which envelopes it! With some natural shapes, we doubt whether an ox will not draw as much by his head as when harnessed in a yoke. As we use these animals, the pressure is against a movable and moving limb. Should we not, reasoning as from the books, expect to find this arrangement resulting in lameness, and finally in utter helplessness? But our point is that we must not go to a college library to learn this, but into the field, and by actual "experiment" learn the actual fact.

The best slope for roofs is another of this class of doubtful facts. The mathematician can tell with absolute certainty which of several plans will consume most lumber, and which is the strongest. He may not be able to tell which, under existing circumstances, is actually the best.

The whole science of *friction* is at best an approximation to the truth. What is established as a general law is the result of a given number of experiments. One more or one less would have lessened or increased the average result. Friction, in certain given instances, may have been tested till the exact truth is very nearly ascertained. But one well-conducted experiment is sometimes enough to prove a theory or general rule fundamentally defective. One illustration occurs to us while we are writing. Book-farmers, when they saw, and their good judgment approved the position, that breaking up and disintegrating the soil qualified it the better to produce crops, established the precept, "plough, *plough*, PLOUGH." We have seen it so printed "in the books." But one of the best farmers in New-England recently reasoned himself into a query on this subject, and put his queries to the test, and became convinced that frequent ploughing was injurious to the crops, particularly in a drought. Now many farmers see all this as plainly as possible, and wonder that any could have thought differently; but there is by no means, as yet, a general agreement among farmers on this point.

Another similar case occurs to us. Ten or twelve years ago, our learned men began to experiment with electro-magnetism as a motive power. And we well remember the first "model car" on a circular railroad, flying round, moved only by this power, at a great speed. Here was "experiment" and science too. But science claimed more. "There is no limit to the application of this power; all our trains can be carried and will be carried by this alone. Was "science" right in all this? The unremitting efforts of more than one, from that day to this, have not yet found a way of doing more than the work of "six horses," and this, we believe, only by accumulating power by the rapid revolution of a very heavy wheel, before the weight was attached. The only service that we have known performed by this agent, in the actual and continued and reliable performance of useful labor, is, to cry fire and ring the bells for the good people of Boston.

A similar result has followed the endeavors of the theorist, the mere

book-mechanic, to obtain a great amount of labor out of the hydraulic ram, as illustrated on another page of this journal.

Many of the various and apparently interminable questions relating to the wholesomeness of certain kinds of food, or of drinks, we think, belong to this class. One wise physician denounces coffee, another tea, another chocolate, while a third believes that cold drinks chill the stomach, and a fourth is sure that hot drinks essentially weaken it. Does not each found his belief on what he has seen, or experienced, or read? Accurate and honest observation is the last appeal that can be taken amid all this confusion of theories.

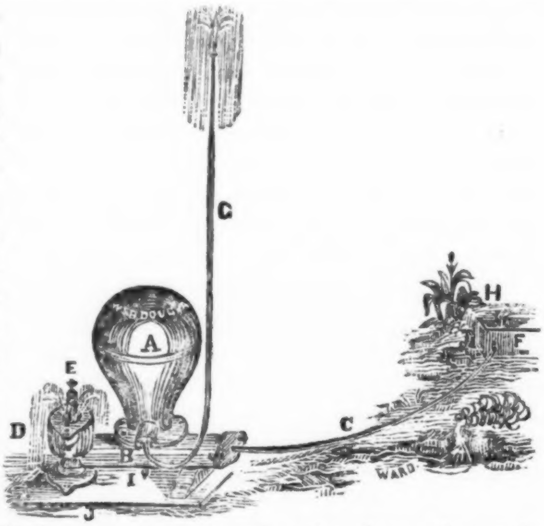
Every science must rest upon its own inherent merits, and when these are established, it may demand our assent, while it confines itself within its true limits. Beyond, it can claim no homage of any man. If the chemist tells us that water is composed of two elements, and exhibits the evidence of it, we have no right to deny it. If he states further that these elements are both destructive to life, and that therefore it must not be used as a beverage, we may appeal to long and constant and universal use, not only without injurious, but with positively beneficial effects, with no evidence of experience to the contrary, as quite a sufficient answer.

The superiority of certain mechanisms in our ordinary labor can be tested only by experience. This proves its mathematics to be true or false. If the theory is sound, fair experiment will only illustrate its truth. If it is unsound, the same experiment will expose its misrepresentations. Either may be erroneously conducted — the demonstration or the experiment — and hence repeated tests are often important. *Facts*, however, are stubborn things, and actual trial is of far greater value than the theories of even very learned men.

HYDRAULIC RAM.

Since the short article on page 17, which contains a few suggestions on this motive power, was placed in the hands of the printer, we have met with a very clever account of it in the *Mechanic;* and we are rather pleased to see that the indefiniteness with which the whole operation of it floats in our mind, appears to be the rule rather than the exception, as we had supposed it was. The editor says: "The alternate action of the valves, produced by the oscillatory motion of the water in the ram, shows plainly the physical causes which produce the effect of this machine; but they never have been sufficiently understood to furnish the basis of a mathematical formula. It has been supposed that the passive resistance, and especially those arising from the shock or blow given by the valves, interpose difficulties in determining their value, which render any estimate of the whole dynamic effect almost impossible; hence its effective power as a motor has always been determined by experiments." The momentum communicated to the still water is estimated as from 57 to 70 per cent. If 31·5 galls. water are used per minute, in a fall of 37 feet, its momemtum becomes $31{\cdot}5 \times 37 = 1165{\cdot}5$. If the quantity of water raised 195 feet be 3·85 galls. per minute, *its* momentum becomes $195 \times 3{\cdot}85 = 750{\cdot}75$. That is, the ram transmits $\frac{750}{1165}$ of the whole water used, or about 64 per cent.

The first invention of this motive power is ascribed to Mr. Whitehurst, a watchmaker of Derby, England, in 1772. In 1796, Montgolfier originated the same thing, having never seen that by Whitehurst.



The operation of the hydraulic ram is as follows: At H is a spring, or other constant supply of water. A pipe, perhaps $1\frac{1}{2}$ inches in diameter, or greater if desired, is laid from the upper surface of this reservoir to a point below, (and the greater the fall the better.) The lower end is furnished with a valve so arranged that, when the water in the pipe has acquired a given velocity, it will be closed. This, of course, suddenly stops the current. If, near the lower end, a perpendicular tube (C) is connected with the main tube, this sudden arrest of the current will force a quantity of water from the main tube to a given height. The pressure on the lower valve being thus relieved, it again opens, and the current again moves, is again arrested, and again the water rises in the tube C. If an air chamber (A) is affixed in connection with the bottom of the upright pipe, it will secure a more regular and constant flow of the water in the perpendicular pipe. It will also furnish security against the bursting of the pipes by the sudden closing of the valve.

The little fountain at D is not an essential part of the mechanism, but is only one of the possible forms of adapting the instrument to ornamental uses.

Estimating the general average as 60 per cent., the following rules are given for ascertaining the several possible results, to wit:

To determine the height to which the water can be raised.—Multiply the quantity of water to pass through the ram by the whole fall on the site, and this product by ·60 Then divide this product by the quantity to be raised in the same time.

Thus, if the supply be 30 galls. per minute, and the fall but 1 foot, how high will this raise 1 gall. per minute? $30 \times 1 = 30 \times \cdot 60 = 18 \div 1 = 18$, the height to which this quantity can be raised.

To determine how much water can be raised a given height.—Multiply the quantity on the site by its fall, and this product by ·60, and then divide by the given height.

If 100 galls. flow per minute, the fall be 6 feet, and the height required 70 feet, $100 \times 6 = 600 \times \cdot 60 = 360 \div 70 = 5$ galls. nearly per minute.

The principal sources of mistake in these rules are perhaps these: 1. The want of accuracy in the ·60, which is assumed as the average. This ratio will vary more or less with the length of the tubes through which the water is forced, the number or extent of angles or curves, the nature and condition of the tubes through which it passes, and this on the supposition that the machine itself is perfect in its construction.

The writer of the remarks already quoted closes with the following paragraph:

"When the water ram was first invented, it was supposed it could be used for raising large quantities of water; but as yet all attempts to elevate respectable volumes have failed, on account of the violent shock of the valves and the heavy pulsations of the machine, which are so severe as to render it impossible to make them sufficiently strong to stand any length of time. We are

of the opinion that all these difficulties could be removed. It is to be hoped that some of our inventive mechanics will consider this subject. The largest size that has been used to any extent, is only equivalent to about one fourth of a horse power."

THE ARABIAN HORSE "TARTAR."

The above cut represents "*Tartar*," one of three young *entire* horses, of Arabian blood, bred by Asa Pingree, Esq., of Topsfield, and now in possession of J. S. Leavitt, Esq., of Salem, Mass. He was six years old in the spring of 1852, and was sired by the imported full-blood Arabian horse "*Imaum.*" "Tartar" stands fifteen and a fourth hands high, weighs nine hundred pounds, and is of a dark-gray color, with dark mane and tail.

The engraving above pretty well shows the configuration of "Tartar," but cannot represent the agile action, flashing eye, and cat-like nimbleness of all his movements. It shows, however, the beautiful Arabian head and finely-set-on neck; his ample, muscular quarters; his flat legs, rather short from the knee downwards; and his long and elastic pastern. All his motions are light and exceedingly graceful, and his temperament so docile that a child may handle him.

The owner of "Tartar" has also two other horses of the same blood. The first, "Sultan," was seven years old in May, 1852, sired by "Imaum," and out of a full-blood English mare; stands fifteen hands high, weighs about nine hundred and fifty pounds, and is of a light gray, or rather light chestnut, dapple color—fine figure and action. The second, "Prince," was seven years old in August, 1852, sired by "Imaum," and out of a Vermont Morgan mare;

stands fourteen and a half hands high, weighs nine hundred and fifty pounds, and of a granite or stone-gray color, which was the color of the sire.

The horse "Imaum," sire of the three horses above mentioned, is the horse referred to in the *New-England Farmer*, for 1849, page 355, as follows:

"In 1842, a fine Arabian horse, of pure blood, was presented by the Sultan of Muscat to David Pingree, Esq., of Salem, as a mark of distinction and particular regard, selected as one of the best from a stud of one hundred horses. Hon. Richard P. Waters, late United States Consul at Zanzibar, who shipped said horse by order of his highness the Sultan, remarks as follows of this race:

"'It is well known that all the superior properties of the Barbary, the Andalusian, and the English blood-horse, are derived from the Arabian. This blood of horses have greater powers of endurance, better wind, or *bottom*, as it is technically called, than any other in the world—besides more ease of motion, activity, and grace of action.

"'It is unnecessary to recommend him to those who are fond of fine horses, as highly worthy of their attention. RICHARD P. WATERS.'"

It is undoubtedly the *combination of different and excellent qualities* which makes up the best horse. The Arabian possesses remarkable powers of speed, and it is said of endurance, too; but we cannot doubt that the Arabian, mingled with the best of the English road horses, has produced a stock better than either of the originals for the practical uses which we make of them.

The introduction of this splendid animal into our columns affords us an opportunity to refer to an anecdote or two, showing the strong love which the Arabs have for their noble steeds. They have exhausted all the wealth of their fine language and rich imaginations in descriptions of the beauty, spirit, and pride of the noble animal. The mare of Shedad, called "Jirwet," is thus mentioned:

Shedad's mare was called Jirwet, whose like was unknown. Kings negotiated with him for her, but he would not part with her, and would accept of no offer or bribe for her; and thus he used to talk of her in his verses: "Seek not to purchase my horse, for Jirwet is not to be bought or borrowed. I am a strong castle on her back; and in her bound are glory and greatness. I would not part with her were strings of camels to come to me, with their drivers following them. She flies with the wind without wings, and tears up the waste and the desert. I will keep her for the day of calamities, and she will rescue me when the battle-dust rises."

What energy and power there is in the following description:

"But at the clash of arms, his ears afar
Drink the deep sound, and vibrate to the war;
Flames from each nostril roll in gathered stream;
His quivering limbs with restless motion gleam;
O'er his right shoulder, floating full and fair,
Sweeps his thick mane and spreads his pomp of hair;
Swift works his double spine; and earth around
Rings to the solid hoof that wears the ground."

The Bible has several passages of surpassing grandeur in relation to the horse, showing that his speed and power were appreciated in those remote times. A description bordering on sublimity may be found in Job, chapter xxxix., to which the reader is referred.

We are indebted to our friends, the *New-England Farmer*, for the above cut and description.

MECHANICS OF FARM WORK.

There are various ways in which the labor of farm work may be materially diminished. We now specify sundry modes, in a department of work unlike those already spoken of in previous articles under this title.

Whoever has regaled himself with a trip along Cape Cod, in the warm months of the year, will remember those long rows of wind-mills in some of the lower towns, and especially at Provincetown. They extend, according to our recollection, more than half a mile, at intervals of a few rods. A stranger to the industry of that region would wonder what could be their design. They are for pumping the salt water of the harbor into their salt pans, for the manufacture of salt. They extend their long arms clear above the line of any thing else earthly, for nothing can grow on that desolate sand bank; and being shifted by suitable machinery to accommodate the various changes of the wind, both as to direction and force, they work at the time and the speed their overseers demand. The attachment of these revolving shafts to the piston of the pump is nothing but a crank, or in common parlance the shaft has a double elbow directly over the pump, to which the upper portion of the piston is attached. This mechanical contrivance forces the "idle wind" to do all this labor.

Many a farmer might avail himself of this expedient in providing water for himself, his flocks, and his herds. His oldest son might make the huge arms, by way of amusement; and we are sure that the saving of cold, not to say severe work, might also be quite agreeable to him. But there are other contrivances for this, often more available, and more economical. We refer to the Hydraulic Ram. We need not give a diagram of it, perhaps, for it is in almost every weekly sheet in the country. It is a contrivance eminently adapted, as it always seemed to us, to get round the law of gravitation, or in other words, make water run up hill. This feat it accomplishes, in fact, and by a very simple process. Were we to try to talk scientifically upon it, we might say, that it makes itself efficient by taking advantage of the laws of dynamics in connection with statics, or by making running water to exert an influence upon still water. Perhaps the principle involved may be made intelligible by this. A cubic foot of running water has a certain momentum. By leading it into pipes, with valves, this momentum may be communicated to still water in those pipes, in such manner as to meet the wishes of the mechanic. A ball rolling down an inclined plane, will roll up another contiguous to it. If its momentum was communicated to other *little* balls at the junction of the planes, these little ones would rise so much higher than the large one, as they are less in size. It is on this principle the Hydraulic Ram acts. Half the farmers in the country, at an outlay of less than $50 or $100, and often not over $25, might have a constant supply of fresh water, both for bipeds and for quadrupeds. Irrigation of fields might be secured by this mechanism, and the amount of root crops, grass, &c., ofttimes be doubled by the means.

Porterage, or the carriage of burdens, is another matter, about which the strangest notions are entertained, and consequently the most extravagant practices are frequent. In the streets of New-York, you are constantly meeting men and women, foreigners chiefly, with heavy burdens on their heads. In Yankeedom such a sight would be as strange as a sight of an elephant. Barnum's Sea-Tigress, at his New-York Museum, is nothing to it. We except, of course, those cities where Germans congregate. Which

is right, the foreigner or the Yankee? Many of the latter resort to a contrivance for carrying buckets, which is sometimes, at least, very convenient: a piece of light timber, fitted to place on and across the neck and shoulders, from which buckets, &c., may be suspended on cords of a length to avoid the ground as the carrier ordinarily walks. This seems limited also to certain localities, though in some places it is very common. It is more convenient in farming districts than in crowded cities. And we are here reminded of a remark or two in relation to the modes of attaching quadrupeds, as well as bipeds, to their various burdens. Yokes are generally used for oxen and *cows*, and collars and breastplates for the horse kind. But we have seen oxen harnessed very much after the fashion of a horse, and we are by no means certain that we are so much in advance of our less scientific neighbors, on these practical points, as we have supposed. Many wise men contend for the use of collars; others equally wise, reject them. Habit does much on all these points. The point of pressure, or line of draft, is not the same in the collar as in the breastplate, but higher, and its arrangement is such that it should be so calculated, to secure a proper draught. Besides, a horse throws himself down upon his load when he draws, so that for this reason also, the line of the traces or chain should be higher than otherwise would be proper. The degree of difference should depend on circumstances—the form of the horse's breast, the shape, height, &c., of the shoulder, and the amount of effort the animal is required to put forth. As a general rule, however, the line of the trace should be at right angles to that of the collar, when fitted to the shoulder of the horse.

PRESSURE AGAINST WALLS.

If a hill or mound is cut through, leaving the bank or terrace perpendicular, a wall may be required, to guard against an avalanche or slide. Should such an event happen, the amount of the loosened earth would vary, according to the nature of the soil. If it were loose and sandy, a greater amonnt would be detached than if it were a firm and strong soil. In both cases, however, the base line of the slide, so to speak, or technically the line of the rupture, will be a straight line, and the angle formed by it and the perpendicular will range from 60° to 45°. The point of greatest pressure is at one third the height of the bank.

If this wall is built of bricks, and the soil be clay, the thickness should be about one sixth its height. If of unhewn stones, with smooth face on both sides, a little less. If the soil is gravel, the wall should be thicker by two or three per cent. If the soil is sand, the wall must be nearly twice as thick as for clay. The upper half of the wall may diminish in width, according to circumstances.

THE USE OF LIME IN AGRICUTURE.

Lime is so important an element in our crops, and so useful in the compost heap, that we desire to present our readers with a portion of a very able article on the subject, by Professor Johnson. We commend it to the careful study of every farmer. The learned writer remarks as follows:

The theory of the action of lime upon the land has occupied much attention among practical men in various countries. It may still be difficult to clear up every fact regarding it in a satisfactory manner. Yet in the following sections I hope to present such an explanation of the mode in which it acts, and of the chemical principles by which its action is regulated, as shall be both intelligible to the ordinary reader, and generally satisfactory to all.

GENERAL ACTION OF LIME AS A CHEMICAL CONSTITUENT OF THE SOIL.

Lime, as I have already shown, acts in two ways upon the soil. It produces a *mechanical* alteration, which is simple and easily understood, and is the cause of a series of *chemical* changes, which are really obscure, and are as yet susceptible of only partial explanation.

In the finely-divided state of quick-lime, of slaked lime, or of soft and crumbling chalk, it stiffens very loose soils, and opens the stiffer clays; while, in the form of limestone gravel or of shell-sand, it may be employed either for opening a clay soil or for giving body and firmness to boggy land. These effects, and their explanation, are so obvious that it is unnecessary to dwell upon them more than has already been done.

The purposes served by lime as a chemical constituent of the soil are at least of four distinct kinds.

1. In every state of chemical combination it supplies one or more kinds of inorganic food, which appear to be necessary to the healthy growth of all our cultivated plants.

2. In the state of quick-lime or of carbonate it performs three additional functions.

a. It neutralizes acid substances which are naturally formed in the soil, and decomposes other noxious compounds which are not unfrequently within reach of the roots of plants, producing in their stead substances which are not only harmless but often directly useful to vegetation.

b. It changes the inert vegetable matter in the soil, liberates the inorganic substances it contains, and thus gradually renders it useful to vegetation.

c. It aids and promotes the decomposition of the mineral or rocky fragments of which so much of all our soils consists, sets free the mineral substances they contain, and thus enables them to become useful to the growth of plants.

These several modes of action it will be necessary to illustrate in some detail.

OF LIME AS THE FOOD OF PLANTS.

On examining the chemical nature of the ash of plants, it is found that lime in all cases forms a considerable proportion of its whole weight. Hence the reason why lime is regarded as a necessary food of plants, and hence also one cause of its beneficial influence in general agricultural practices.

The quantity of pure lime contained in the crops produced upon one acre, during a four years' rotation, amounts on an average to about 200 lbs., equal to 360 lbs. (say 3½ cwt.) of carbonate of lime, in the state of marl, shell-sand, or limestone gravel. It is obvious, therefore, that one of the most intelligible purposes served by lime, as a chemical constituent of the soil, is to supply this comparatively large quantity of lime, which, in some form or other, must enter into the roots of plants.

But the different crops which we grow contain lime in unlike proportions. Thus the average produce of an acre of land under the following crops contains of lime—

		Lime in the		
	Per acre.	Grain.	Straw or Roots.	Total.
Wheat,	(25 bush.)	1	12	13 lbs.
Barley,	(40 bush.)	1½	15½	17 lbs.
Oats,	(50 bush.)	3	19	22 lbs.
Rye,	(26 bush.)	1½	15½	17 lbs.
Beans,	(25 bush.)	2½	34	36½ lbs.
Turnips,	(20 tons)	46	72	118 lbs.
Potatoes,	(8 tons)	8	31	39 lbs.
Red Clover,	(2 tons)	—	77	77 lbs.
Rye Grass,	(2 tons)	—	30	30 lbs.

These quantities are not constant, and generally all our crops contain more lime when grown upon land to which lime has been copiously applied. But the very different quantities contained in the several crops, as above exhibited, show that one reason *why lime favors the growth of some crops more than others* is, that some actually take up a larger quantity of lime as food. These crops, therefore, require the presence of lime in greater proportion in the soil in order that they may be able to obtain it so readily that no delay may occur in the performance of those functions, or in the growth of those parts, to which lime is indispensable.

RELATION OF THE PERIOD OF GROWTH OF A PLANT TO THE EFFECT AND PROPORTION OF LIME IN THE SOIL.

In connection with the quantities of lime actually found in plants, another important circumstance must be taken into consideration.

Whatever kind or amount of food a plant may require to bring it to maturity, it must collect the whole during the time usually allotted to its growth. Thus the longer a crop is in the ground, the slower it grows; and the longer it usually takes to come to maturity, the more time it has to collect its food from the soil by means of its roots. Barley germinates and ripens its seed within three months—in Sicily sometimes within three weeks—while wheat is from six to ten months in the ground. The roots of barley, therefore, must do much more work in the same time than those of wheat. They must, among other things, take up the 17 lbs. of lime in the above table in three months, while wheat takes up on an average only 13 lbs. in six months. Now, to effect this in the same soil, it must send out more roots in quest of this kind of food than the wheat plant will require to do, and thus it must waste more of its vegetative strength under ground. But if we make the supply of lime in the soil more abundant, we diminish the labor of the barley plant, and greatly facilitate its growth.

Thus we arrive at the conclusion that the proportion of lime contained in the soil ought to be adapted not only to the proportion which the perfect plant is found to contain and require, but to the period also which is allotted to its natural growth. For crops which run their course quickly, a larger proportion of lime, as well as of all other kinds of food, will be required, or will be beneficial, than for crops that are longer in coming to perfection. Has this fact any thing to do with the earlier harvests upon well-limed land, or with its peculiar fitness for the growth of barley?

THE CHEMICAL ACTION OF LIME IS EXERTED CHIEFLY UPON THE ORGANIC MATTER OF THE SOIL.

There are four circumstances of great practical importance, which cannot be too carefully considered in reference to the theory of the operation of lime. These are—

1. That lime, unless in the form of compost, has comparatively little or no effect upon soils in which organic matter is deficient.

2. That its apparent effect, at least upon the corn crop, is inconsiderable during the first year after its application, compared with that which it produces in the second and third years.

3. That its effect is most sensible when it is kept near the surface of the soil, and gradually becomes less as it sinks towards the subsoil. And

4. That, under the influence of lime, the organic matter of the soil disappears more rapidly than it otherwise would do, and that, after it has thus disappeared, equal additions of lime are much less beneficial than before.

It is obvious, from these facts, that *in general*, the main beneficial purpose served by lime is to be sought for in the nature of its chemical action upon the organic matter of the soil; an action which takes place slowly, which is hastened by the access of the air, and which causes the organic matter itself ultimately to disappear.

OF THE FORMS IN WHICH ORGANIC MATTER USUALLY EXISTS IN THE SOIL.

The organic matter which lime thus causes to disappear is presented to it in one or other of five different forms:

1. In that of recent, often green, moist and undecomposed roots, leaves and stems of plants.
2. In that of dry and still undecomposed vegetable matter, such as straw.
3. In a more or less decayed or decaying state, generally black or brown in color, and often in some degree soluble in water. In such a state we see it in peat.
4. In what is called the *inert* state, when spontaneous decay ceases to be sensibly observed. And—
5. In the state of chemical combination with the earthy substances, forming humates, ulmates, &c., with the alumina, and with the lime or magnesia which exist in the soil.

Upon these several varieties of organic matter lime acts with different degrees of rapidity.

CIRCUMSTANCES UNDER WHICH THE DECOMPOSITION OF THE ORGANIC MATTER MAY TAKE PLACE.

The final result of the decomposition of these several forms of organic matter, when they contain no nitrogen, is their conversion into carbonic acid and water only. They pass, however, through several intermediate stages before they reach this point; the number and rapidity of which, and the kind of changes they undergo at each stage, depend upon the circumstances under which the decomposition is effected. Thus the substance may decompose—

1. *Alone*, in which case the changes that occur proceed slowly, and arise solely from a new arrangement of its own particles. This kind of decomposition rarely occurs to any extent in the soil, and then only in such as are very compact, and impervious to air and water.

2. *In the presence of water only.*—This also seldom takes place in the soil. Trees, long buried in moist clays impervious to air, exhibit the kind of slow alteration which results from the presence of water alone. In the bottoms of lakes, ditches, and boggy places also from which inflammable gases arise, water is the *principal* cause of the more rapid decomposition.

3. *In the presence of air only.*—In nature organic matter is never placed in this condition, the air of our atmosphere being always largely mixed with moisture. In dry air decomposition is exceedingly slow, and the changes which dry organic substances undergo in it are often scarcely perceptible.

4. *In the presence of both water and air.*—This is the almost universal condition of the organic matter in our fields and farm-yards. The joint action of air and water, and the tendency of the elements of the organic matter to enter into new combinations, cause new chemical changes to succeed each other with much rapidity. It will of course be understood that moderate, warmth is necessary to the production of these effects.*

* A familiar illustration of the conjoined efficacy of air and water, in producing oxidation (rusting), is exhibited in their action upon iron. If a piece of polished iron be kept in perfectly dry air, it will not rust. Or if it be completely covered over with pure boiled water in a well stoppered bottle, from which air is excluded it will

5. *In the presence of lime*, or of some other alkaline substance, (potash, soda, or magnesia.)—Organic matter is often found in the soil in such a state that the conjoined action of both air and water is unable, without other aid, to hasten its decomposition. A new chemical agency must then be introduced, by which the elements of the organic matter may again be set in motion. Wood-ashes, kelp, carbonate of soda, &c., act in this way; but lime is the agent which, for this purpose, is most largely employed in practical agriculture.

GENERAL ACTION OF ALKALINE SUBSTANCES (POTASH, SODA, ETC.) UPON ORGANIC MATTER.

It is this action of alkaline matters upon the organic substances of the soil, in the presence of air and water, that we are principally to investigate.

When organic matter undergoes decay in the presence of air and water only, it first rots, as it is called, and blackens, giving off water or its elements chiefly, and forming *humus*—a mixture of humic, ulmic, and some other acids, with decaying vegetable fibre. It then commences, at the expense of the oxygen of the air and water, to form other more soluble acids, (malic, acetic, lactic, crenic, mudesic, &c.,) among which is a portion of carbonic acid; while by the aid of the hydrogen of the water which it decomposes, it produces also one or more of the many inflammable compounds of carbon and hydrogen, which often rise up as marsh-gas does from stagnant pools in summer, and escape into the air.

Thus there is a tendency towards the accumulation of acid substances of vegetable origin in the soil, and this is more especially the case when the soil is moist, and where much vegetable matter abounds. The effect of this superabundance of acid matter is, on the one hand, to arrest the further natural decay of the organic matter, and on the other to render the soil unfavorable to the healthy growth of young and tender plants.

The general effect of the presence of alkaline substances in the soil is to counteract these two evils. They combine with and thus remove the sourness of the acid bodies as they are formed. In consequence of this the soil becomes *sweeter*, or more propitious to vegetation, while the natural tendency of the vegetable matter to decay is no longer arrested.

It is thus clear that an immediate good effect upon the land must follow either from the artificial application, or from the natural presence of alkaline matter in the soil, while at the same time it will cause the vegetable matter to disappear more rapidly than would otherwise be the case. But the effect of such substances does not end here. They actually dispose or provoke—*predispose* chemists call it—the vegetable matter to produce acid substances, in order that they may combine with them, and thus cause the organic matters to disappear more rapidly than they otherwise would do: in other words, they hasten forward the exhaustion of the vegetable matter of the soil.

Such is the general action of *all* alkaline substances. This action they exhibit even in close vessels. Thus a solution of grape sugar, mixed with potash and left in a warm place, slowly forms a sour substance called *melassic acid;* while in cold lime water the same sugar is gradually converted into

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remain bright and untarnished. But if a polished rod of iron be put into an open vessel half full of water, so that one part of its length only is under water, then the rod will begin very soon to rust at the surface of the water, and a brown ochry ring of oxide will form around it exactly where the air and water meet. From this point the rust will gradually spread upwards and downwards. So it is with the organic matter of the soil. Wherever the air and water meet, their decomposing action upon it in ordinary temperatures soon becomes perceptible.

another acid called the *glucic.* But in the air other acids are formed in the same mixtures, and the changes proceed more rapidly. Such is the case also in the soil, where the elements of the air and of water are generally at hand to favor the decomposition.

But the *nature* of the alkaline matter which is present determines also the rapidity with which such changes are produced. The most powerful alkaline substances, potash and soda, produce all the above effects most quickly: lime and magnesia are next in order; and the alumina of the clay soils, though much inferior to all these, is far from being without an important influence.

Hence one of the benefits which result from the use of wood-ashes containing carbonate of potash, when employed in small quantities, and along with vegetable and animal manures as they are in this country; but hence also the evil effects which are found to follow from the application of them in too large doses, or too frequently repeated. Thus in countries where wood abounds, and where it is usual as in Sweden and Northern Russia to burn the forests and to lay on their ashes as manure, the tillage can be continued for a few years only. After two or three crops the land is exhausted, and must again be left to its natural produce.

SPECIAL EFFECTS OF CAUSTIC LIME UPON THE SEVERAL VARIETIES OF ORGANIC MATTER IN THE SOIL.

The effects of lime upon organic matter are precisely the same in kind as those of alkaline substances in general. They are only less in degree, or take place more slowly than when soda or potash is employed. Hence the greater adaptation of lime to the purposes of practical agriculture.

1. *Action of caustic lime alone upon vegetable matter.*—If the fresh leaves and twigs of plants, or blades and roots of grass, be introduced into a bottle surrounded with slaked lime and corked, they will slowly undergo a certain change of color, but they may be preserved for years without exhibiting any striking change of texture. If dry straw be so mixed with slaked lime it will exhibit still less alteration. In either case also the changes will be even less perceptible if, instead of slaked lime, the *carbonate* (or *mild* lime) in any of its forms be mixed with these varieties of vegetable matter. On some other varieties of vegetable matter—such for example as are undergoing rapid decay, or have already reached an advanced stage of decomposition—an admixture of slaked lime produces certain perceptible changes immediately, and mild lime more slowly; but these changes being completed, the tendency of *lime alone* is to arrest rather than to promote further *rapid* alterations. Hence the following opinions of experienced practical observers must be admitted to be theoretically correct in so far as they refer to *slaked lime acting alone.*

"If straw or long dung be mixed with slaked lime it will be preserved."—*Morton on Soils*, 3d edition, p. 181.

"Lime mixed in a mass of earth containing the live roots and seeds of plants will not destroy them."—*Ibid.*

"Sir H. Davy's theory that lime dissolves vegetable matter is given up; in fact, it hardens vegetable matter."—*Mr. Pusey, Royal Agricultural Journal*, iii. p. 212.

These opinions I have said are probably correct in so far as regards the unaided action of slaked lime. They even express, with an approach to accuracy, what will take place in the interior of compost-heaps of a certain kind, or in some very dry soils; but that they cannot apply to the ordinary action of lime upon the soil is proved by the other result, of universal observation, *that lime, so far from preserving the organic matter of the land to*

which it is applied, in reality wastes it—causes, that is, or disposes it to disappear. It is unfortunate indeed that opinions such as those above quoted should be so generally or broadly expressed by practical men, as they tend to propagate erroneous impressions.

2. *Action of caustic lime on organic matter in the presence of air and water.*—In the presence of air and water, when assisted by a favoring temperature, vegetable matter, as we have already seen, undergoes spontaneous decomposition. In the same circumstances lime promotes and sensibly hastens this decomposition, altering the forms or stages through which the organic matter must pass, but bringing about more speedily its final conversion into carbonic acid and water. During its natural decay in a moist and open soil, organic matter gives off a portion of carbonic acid gas, which escapes into the air, and forms at the same time certain other acids, which remain in the dark mould of the soil itself. When quick or slaked lime is added to the land, its first effect is to combine with these acids—to form carbonate, humate, &c., of lime, till the whole of the acid matter existing at the time is taken up. That portion of the lime which remains uncombined either slowly absorbs carbonic acid from the air, or unites with the carbonic already formed, to produce the known compound of hydrate with carbonate of lime*—waiting in this state in the soil till some fresh portions of acid matter are formed with which it may combine. But it does not inactively wait; it persuades and influences the organic matter to combine with oxygen of the air and of the water with which it is surrounded, for the production of such acid substances, till finally the whole of the lime becomes combined either with carbonic acid or with some other acid of organic origin.

Nor at this stage are the action and influence of lime observed to cease. On the contrary, this result will in most soils be arrived at in the course of one or two years, while the beneficial action of the lime itself may be perceptible for twenty or thirty years. Hence there is much apparent ground for the opinion of Lord Kames, "that lime is as efficacious in its (so-called) effete as in its caustic state." Even the more strongly expressed opinion of the same acute observer, "that lime produces little effect upon vegetables till it becomes effete," derives much support from experience, since lime is known to have comparatively little effect upon the productiveness of the land till one or two years after its application; and this period, as I have said, is in most localities sufficient to deprive even slaked lime of all its caustic properties.

Of the saline compounds† which caustic lime thus forms either immediately or ultimately, some, like the carbonate and humate, being very sparingly soluble in water, remain more or less permanently in the soil; others, like the acetate of lime,‡ being readily soluble, are either washed out by the rains or are sucked up by the roots of the growing plants. In the former case they cause the removal of both organic matter and of lime from the land; in the latter they supply the plant with a portion of organic food, and at the same time with lime, without which, as we have frequently before remarked, plants cannot be maintained in their most healthy condition.

ACTION OF MILD OR CARBONATE OF LIME UPON VEGETABLE MATTER OF THE SOIL.

The main utility of lime, therefore, after it has first removed the sourness

* That compound, namely, which is produced when quick lime slakes spontaneously in the air, and which has been described in a previous paper.

† Saline compounds or salts are always formed when lime, magnesia, potash, soda, &c., combine with acids.

‡ Acetate of lime consists of acetic acid or vinegar and lime.

it found in the soil, depends upon its prolonged *after*-action upon the vegetable matter. What is this action, and in what consists the benefit to which it gives rise?

In answering this question, it is of importance to observe that all the effects produced by alkaline substances in general, whether by lime or by potash in the caustic state, are produced in *kind* also by the same substances, in the state of carbonate. The carbonic acid with which they are united is retained by a comparatively feeble affinity, and is displaced with greater or less ease by almost every other acid compound which is produced in the soil. With this displacement is connected an interesting series of beautiful reactions, which it is of consequence to understand.

The end or termination which nature, so to speak, has in view in all the changes to which she subjects organic matter in the soil, is to convert it, with the exception of its nitrogen, into carbonic acid and water. For this purpose it combines at one time with the oxygen of the air, while at another it decomposes water, and unites with the oxygen or the hydrogen which are liberated, or with both, to form new chemical combinations. Each of these new combinations is either immediately preliminary to, or is attended by the conversion of a portion of the elements of the organic matter into one or other of those simpler forms of matter on which plants live. Now during these preliminary or preparatory steps acid substances, as I have already explained, are among others constantly produced. With these acids the carbonate of lime, when present in the soil, is ever ready to combine; but in so combining it gives off the carbonic acid with which it is already united, and thus a continual, slow evolution of carbonic acid is kept up as long as any undecomposed carbonate remains in the soil.

I do not attempt to specify by name all the various acid substances which are thus formed during the oxidation of the organic matter, and which successively unite with the lime, because the entire series of interesting and highly important changes which organic substances undergo in the soil has, as yet, been too little investigated to permit us to do more than speak in general terms of the nature of the chemical compounds which are most abundantly produced. Of two facts, however, in regard to them we are certain: that they are simpler in their constitution than the original organic matter itself from which they are derived, and that they have a tendency to assume still simpler forms, if they continue to be exposed to the same united action of air, water, and alkaline substances.

Hence the compound which lime has formed with the acid substances of the soil—the humate, ulmate, &c.—themselves hasten forward to new decompositions, unite with more oxygen, liberate slowly portion after portion of their carbon, in the form of carbonic acid, and of their hydrogen in the form of water, till at length the lime itself is left again in the state of carbonate or in union with carbonic acid only. This residual carbonate of lime begins again the same round of changes through which it had previously passed. It gives up its carbonic acid at the bidding of some more powerful organic acid produced in its neighborhood, while this acid by exposure to the due influences undergoes new alterations, till it also is finally resolved into carbonic acid and water.

Two circumstances deserve to be borne in mind in reference to these successive decompositions: first, that as they proceed more easily soluble compounds of lime are now and then formed, some of which are washed out by the rains and escape from the soil, while others minister to the growth of plants; and second, that very much carbonic acid is produced as their final

result, of which also part is taken up by the roots of plants and part escapes into the air. Thus at every successive stage a portion of organic matter is lost to the soil. If this quantity be greater than that which is yearly gained in the form of roots, or decayed leaves and stems of plants, or of manure artificially added, the soil will be gradually exhausted; if less, it will every year become more rich in vegetable matter.

It is also to be borne in mind that, although for the purpose of illustration I have supposed the carbonate of lime first formed in the soil to be subsequently combined with other acids which gradually decompose and leave it again in the state of carbonate, yet it will rarely happen that the whole of the carbonate of lime in the soil will be brought at one and the same time into any of these new states of combination. In general, a part of it only is thus at any time employed in working up the acid substances produced. But it is necessary that it should be universally diffused through the soil, in order that it may be every where at hand to perform the important part of its functions above explained. It is only where little lime is present, or where decaying vegetable matter is in exceeding abundance, that the whole of the carbonate can at one and the same time disappear.

THE BINOCULAR MICROSCOPE.

Prof. Riddell, of the University of Louisiana, has invented a microscope of which the following account is published in the *New-Orleans Monthly Medical Register:*

At a meeting of the Physico-Medical Society, on Saturday evening, 2d October, Prof. J. L. Riddell called the attention of the Society to an instrument of his own invention and manufacture, which promises to be of incalculable advantage in microscopic researches, especially in the prosecution of microscopic anatomy and physiology.

He remarked that he last year contrived, and had lately constructed and used, a combination of glass prisms, to render both eyes serviceable in microscopic observation. The plan is essentially as follows: Behind the objective, and as near thereto as practicable, the light is equally divided, and bent at right angles and made to travel in opposite directions, by means of two rectangular prisms, which are in contact by their edges, that are somewhat ground away. The reflected rays are received at a proper distance for binocular vision upon two other rectangular prisms, and again bent at right angles, being thus either completely inverted, for an inverted microscope, or restored to their original direction. These outer prisms may be cemented to the inner, by means of Canada Balsam; or left free to admit of adjustment to suit different observers. Prisms of other form, with due arrangement, may be substituted.

This method proves, according to Prof. Riddell's testimony, equally applicable to every grade of good lenses, from Spencer's best sixteenth to a common three-inch magnifier, with or without oculars or erecting eye-pieces, and with a great enhancement of penetrating and defining power. It gives the observer perfectly correct views, in length, breadth and *depth*, whatever power he may employ; objects are seen holding their true relative positions, and wearing their real shapes. In looking at solid bodies, however, depressions sometimes appear as elevations, and *vice versa*, forming a curious illusion; for instance, a metal spherule may appear like a glass ball silvered on

the under side, and the margin of a wafer may seem to ascend from the water into the air.

With this instrument the microscopic dissecting knife can be exactly guided. The watchmaker and artist can work under the binocular eye-glass with certainty and satisfaction. In looking at microscopic animal tissues, the single eye may perhaps behold a confused amorphous, or nebulous mass, which the pair of eyes instantly shape into delicate superimposed membranes, with intervening spaces, the thickness of which can be correctly estimated. Blood corpuscles, usually seen as flat disks, loom out as oblate spheroids. Prof. Riddell asserted, in short, that the whole microscopic world could thus be exhibited in a new light, acquiring a ten-fold greater interest, displaying in every phase a perfection of beauty and symmetry indescribable.

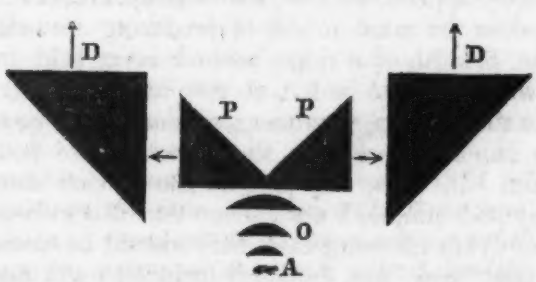
The following extract from a letter to Dr. Burnett, of Boston, will, perhaps, with its accompanying sketch, still better illustrate the advantages and mechanical design of the instrument:

University of Louisiana, New-Orleans, October 31st, 1852.

You do not over-estimate the value of the Binocular Microscope. It will be found indispensable to the physiologist, the pathologist, and the naturalist, who would correctly observe nature. I do not think it can be well adapted to microscopes of the existing forms; but the bulk of the instrument must be different. I hope to have the pleasure, ere long, of sending you drawings and descriptions, such as to enable any optician readily to construct the instrument.

The erecting eye-pieces will be essential in the compound microscope for general purposes; because without them, solid opaque objects present an illusive appearance; depressions appearing as elevations, and elevations as depressions. With the erectors, bodies appear as they should, enabling the observer to judge as well of their shape as I can judge of the shape of books, ink-stands, &c., on the table before me. Spencer's inch objective, mounted in this way, makes the best conceivable microscope for dissection.

The accompanying sketch exhibits in section, of real size, the essential arrangements of the Binocular Microscope. There is some advantage in cementing with Canada balsam the adjacent surfaces of D and P together. The instrument, however, will not then admit of inversion, and is not so efficiently adjustable to the eyes of different observers.



A. Object to be seen.

O. Objective combination.

P P. Two rectangular prisms of fine glass, separating the rays by internal reflection, at 45°.

D D. Outer rectangular prisms, adjustable, for different distances between

the eyes. These send each bundle of rays in the direction denoted by the arrows, to be received by the oculars and erectors, also adjustable.

A O P P may be inverted, or turned half way round, so that the object will be above.

I prefer the stage fixed, and the slow motion for adjusting the focus of the objective, to affect the whole structure AO, PP, DD.

THE POTATO DISEASE.

WE have published but little on this vexed question, chiefly because we had but little that was satisfactory in the opinions or the experiments which have been given to the public. An able English writer seems to us to discuss the matter very sensibly in the following paragraphs. It will be seen that while he admits the disease to be a fungus, he goes behind this point and inquires as to the cause of the fungus; and this he imputes substantially to protracted bad cultivation:

Of all the causes that have been suggested, constitutional debility seems best to agree with the facts we now know connected with this question. It was insisted upon at a very early period of the inquiry, and would certainly have met with more general acquiescence, had not the suggestion been overlaid with so much bad physiology, unsound reasoning, and utterly unfounded hypothesis. It was by no means inconsistent with the theory that the immediate cause was either meteoric or fungoid, or both; and it derived great probability from Mr. Shepherd's practice, above alluded to. That practice mainly consisted in growing seed potatoes apart from those for market, never taking up the sets till they were to be planted; and planting immediately, that is to say, on the very same day.

We observe that a writer in the *Cork Constitution* has revived this view of the cause. He is of opinion "that the potato disease is not produced by electric or atmospheric influence; that it is not 'blight' at all, but is simply the natural and inevitable effect of *exhaustion*, produced by long years of most barbarous treatment, and total disregard of all the well-known rules observed in the care of seeds." "If," he adds, "this theory be real and true, we must look for the '*blight*' next year; and the next, and the next, unless means are adopted for the *resuscitation* of the potato. As *exhaustion* is the *cause* of the disease, so *resuscitation* is the *remedy*, which I rejoice to think may be readily applied, and be also speedy, effectual, and permanent in its effects. Besides the usual modes of producing resuscitation, it is my opinion that if the breadth of a ridge around every field in the land were sown *early* with whole seed, to be left at rest in the ground all winter and until digging time the following summer, or, what would be still better, until *setting* time, then dug *and re-set*, we should soon have potatoes at 2d. per lb. (weight?) again. If, then, any persons should feel disposed to try an experiment so easy and simple, I warn them that it is indispensable to a fair trial of it, that the dykes inclosing each field should be *cleaned* out and dug to a depth of at least three feet, (*uplands* included,) and deeper still if the subsoil at that depth is not found to be perfectly porous. If this be well done, the field will be thoroughly drained, and not one drop of *foreign* water can by any possibility pass *through* it, the frequent drain 'or Deanstonian system' notwithstanding. With regard to the same system, and while I am quite ready to admit that it has been eminently, nay, pre-eminently successful, I nevertheless consider it to be based on false hypothesis, and alto-

gether too expensive ever to admit of general application in this country. But to return. There is one other matter which is indispensable to a fair trial of this experiment. It is, that in setting the seed *each* potato must be allowed as much ground as is usually appropriated to half a dozen, or more, sets. If these two indispensable requisites to a fair trial of this experiment be strictly performed, I dare to promise most satisfactory results."

Assuming this view to be a just one, the case of the potato might be succinctly stated thus:

1. The potato, like all other living things, has a peculiar *vitality* or *vital force*, by means of which, if unimpaired, it is capable of resisting disease, and of braving the attacks of parasites.
2. But if the *vitality decreases*, then the potato becomes liable to disease, and suffers from parasites.
3. The common mode of preserving the potato in heaps, or exposed to the air for long periods of time, has the effect of lowering vitality, and, consequently, of predisposing it to disease, and rendering it incapable of braving the attacks of parasites.
4. This supposed reduction of vital force does not take place suddenly, but comes on slowly, after years of mismanagement.
5. The vital force of the potato having been thus lowered, if an unusually unfavorable season, or peculiar meteoric causes occur, the potato has not enough constitutional energy to resist them, and whole districts are suddenly affected.
6. When this affection has been once experienced, the vitality of the plant is still more lowered, and will continue to be so until the constitutional energy is repaired.
7. Vital energy may be restored by means the reverse of what reduced it, keeping the plant always in the ground, when all its functions of life go on without interruption and by better cultivation.
8. When vital energy is thus restored, then the potato will be able to resist meteoric action, or parasitical attacks, as formerly.

These propositions are, we take it, a true expression of the theory in question, and they deserve the most serious consideration. They show why the Botrytis now commits its ravages, although it had no such effect in former days. They go in fact to the *remote cause* of the disease, which is far more important than the immediate cause. They even show how it has happened that men of intelligence should be still led to believe in the preposterous notion that the potato disease, or the vine-mildew, or any such affections, are caused by insects.

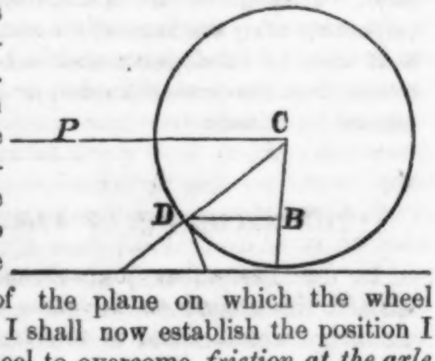
"THE MECHANICS OF FARM WORK" OF NOV. NO. EXAMINED.

In our November journal we pulished an article with the title above quoted, the second on the same subject, and as we had lately read in an exchange what seemed to us erroneous, upon a topic which we were about to discuss, we began by saying: "A recent journal has the following, which bears date from an Agricultural Institute. It states that with an axle three inches in diameter, a given power can draw but half as much as with an axis of only one and a half inches in diameter." But when we looked for the article, that we might copy the writer's language, we could not find it; and hence we filled up our blank space with the second sentence above cited. Being thus left without our testimony, and unwilling to implicate any writer or journal

in teaching error, when we might be mistaken, we declined to give any name or date, and then no one, as we believed, could charge us with doing *him* injustice. But on the 10th December, according to its endorsement, a communication was received at this office, which was placed in our hands on the 12th, in which the writer assumes that he is the person alluded to, but denies having asserted any such doctrine. It would be enough for us to say, "Then you do not answer our description." But as this paper asserts what we think is erroneous, on other important points, and as truth is our only object, we publish below his entire discussion, and append such remarks as seem to us proper. We omit the first page of his communication, because it is a mere repudiation of what we both agree to be unsound, or else mere personal remark, which does not affect the doctrines which are the subject of criticism. It reads as follows:

FOR THE PLOUGH, THE LOOM, AND THE ANVIL.

Messrs. Editors:—Upon mature reflection, you will see there are two other principles involved in the practical solution of this question, namely, *the line of draught* and the *relative size of the wheel to the height of the obstacle* to be overcome. What I said was this: "The power of the wheel to overcome *friction at the axle* depends upon the relative size of the radius of the *wheel* and *axle.*" I then supposed a wheel five feet in diameter, and a wooden axle three inches in diameter, the power will be as 20 to 1; but if an iron axle one and a half inches were substituted for the wooden one, the *power* to overcome friction at the axle will be as 40 to 1, or twice that of the former. You say the amount of power is not at all affected except in friction! Your appeal to experience, to overthrow a scientific truth capable of the clearest demonstration, is somewhat remarkable. Why not prove by men's experience that the earth stands still, and that the sun revolves round it? You do not even stop to define what the arms of the lever are; though you do attempt that when you come to speak of wheels being raised over obstacles! Surely you do not mean that the power to overcome obstacles, and the power to overcome friction at the axle, are the same? From the context we are forced to conclude so. [1.] You draw a line from the centre of the wheel to the point of contact with the obstacle to be surmounted; this you make one arm of the lever, and the other arm the continuation of this line until it meets the ground line. Thus C A* [C D] is one arm of the lever, and A B [the continuation of C D to the ground] the other. Suppose a loaded carriage is moving on a horizontal plane free of obstacles, where then are the arms of the lever? According to your philosophy you have but one arm, as the line drawn from the centre to the obstacle must coincide with a line drawn from the centre to the point of the plane on which the wheel rests. But I shall revert to this again. I shall now establish the position I assumed, viz.: "that the power of the wheel to overcome *friction at the axle* is in the ratio of the radius of the wheel to the radius of the axle." It is evident, when the wheel is made to slide, the whole of the friction is encountered and no mechanical advantage gained; but when a wheel turns on its



* We choose to retain our friend's lettering in this explanation, but as we use a diagram which we had prepared and used in the Dec. number, we add in brackets the lines which the writer indicates, as we have lettered them.

axle, the *friction* is transferred from the ground to the axle, and the greater the weight the greater the friction. In this case, each spoke of the wheel successively becomes a lever, turning on the ground as a fulcrum, while the power is exerted on the end next to the *axis*, (*not axle*,) but the friction on the axle reacts in the opposite direction with a lever power equal to the radius of the *axle;* hence there is a mechanical advantage gained in overcoming the friction at the axle, in the ratio of the radius of the wheel to the radius of the axle. This, remember, is the mechanical power to overcome friction, and is entirely distinct from the amount of friction. You confound the power to overcome friction with the friction itself. You also confound the power to overcome friction at the axle with the power to surmount obstacles. My position is fully sustained by Uriah Parke, in his "Philosophy of Arithmetic," and by D. Olmsted, Professor of Natural Philosophy in Yale College. In fact, it is a well settled principle, sustained by every philosopher (except yourself) whose writings have come under my observation. [2.]

I shall now refer to your position as to the arms of the lever. Professor Olmsted, after proving what I have attempted, says: "Wheels have another important advantage, viz., in overcoming obstacles; in which case they act on the principle of the *bent lever*." You make no distinction between the power to overcome friction at the axle and the power to overcome obstacles. You make the latter to act on the principle of the straight lever! Olmsted on the principle of the *bent lever!* He draws a line at right angles to the line of draught to the point of contact with the obstacle to be overcome, and another line from this point of contact at right angles to a line drawn from the centre of the wheel to the plane on which the wheel rests. Thus in the figure, C P is the line of draught, and M A, [C B,] which is at right angles to it, is one arm of the lever, and N A, [B D,] which is drawn at right angles to C B, is the other arm of the lever, and the mechanical advantage gained in overcoming obstacles will be in the ratio of M A to N A, [C B to B D.] You make the arms of your lever without any reference to the line of draught. Hence the power to overcome obstacles will be the same, no matter in what direction the line of draught be exerted, which is absurd. [3.] You admit yourself the most economical expenditure of power will be at right angles to a line drawn from the centre of the wheel to the point of contact with the obstacle, or at right angles to C A; though you make a blunder when you say through A. You should have said through C, because the power is not applied at A but at C. [4.] You say, as a general rule, *the line of traction* should be parallel to the plane. Olmsted says, "The line of draught should not be horizontal, but inclined upwards towards the breast of the horse, in an angle not less than 15 degrees with the horizon. This brings the strain at right angles with the collar, whereas a horizontal draught lifts the collar upwards, by which the force is wasted and the animal choked." [5.] This point might safely be submitted to the experience of farmers, or to the good sense of your readers. The importance of this subject must atone for the length of this article. And I ask, in justice to your readers, its publication in your journal.

Yours truly, L. H. GAUSE.

Mt. Airy Ag. Inst., Nov. 30th, 1852.

[1.] We have neither affirmed nor denied any thing in reference to the effect the size of the wheel may have upon its power "to overcome friction at the axle." We have been discussing more *weighty* matters. And we were and are content to remain silent, having made only a single remark that had no reference to this or any other writer. But we would now add

that the effect of friction is not a matter for mathematics, nor professors, to demonstrate. It is a mere matter of fact, to be determined only by "experience." These results are noticed, and then recorded in the books. We *do* "suppose the same power has to overcome *all* resistance."

[2.] Our learned friend has erred in this paragraph, according to our view, in more than one particular. And, (1,) he says, "the friction is transferred from the ground to the axle." Our notion is, that a less friction is *substituted* for the greater. Friction cannot be *transferred* without a transfer of the surfaces producing it. If a less is *substituted*, the mathematics of the greater cannot be "transferred" to the less. But, (2,) "axis, not axle." Yet this writer uses both interchangeably, for aught we see. Axis occurs once only, and axle many times. If not used as synonymes, we cannot understand our friend's meaning. There is no such mechanical power brought into action here as the "wheel and *axle*," and there is no *axle* unless the *axis* or *axletree* is one. The term *axle*, distinct from *axis*, cannot be applied to carriages, or any ordinary mode of setting them in motion. It is an essential part of *the wheel and axle*, that the wheel should be *fixed* on its axis, while the power is applied to the wheel, and the weight is attached to the axle. Any change of this arrangement changes the character of the mechanism. Writers use both terms, as we suppose, interchangeably. Otherwise we cannot understand them. But, (3,) what does our friend mean by "friction on the axle"? (*axle* again.) We know of no friction applicable to the "wheel and axle," but the friction of the gudgeon on which IT (the wheel and axle) turns. Can this be meant by the "friction of the axle"? No writer that we have seen regards the size of this gudgeon as of sufficient importance to allude to it, as affecting the motive power of this mechanic combination. We have already explained our views sufficiently on this matter, and we have not changed them. But, (4,) we *doubt* whether the ground is a fulcrum, *as explained by this writer*. He says, "each spoke of the wheel successively becomes a lever, turning on the ground as a fulcrum, while the power is exerted on the end next to the *axis*, but the friction on the *axle* reacts," &c. Let us look at this. The ground is the fulcrum, the power is at the centre of the wheel, while the resistance, the friction, is between them. And this writer increases his power, by lengthening the distance between the fulcrum and the resistance! We will here borrow *one* of his notes of admiration.

[3.] Again, our correspondent mistakes our remark, and, as we think, mistakes in his mathematics. We did state, in the article in November, that under a given state of facts, the spoke C A, "from the centre to the obstacle," was one arm of the lever, and the same line continued from A to the ground was another arm. We say so now. But we did not say that this formula was for universal application. If there was "no obstacle," there could be no such line as C A was described to be. But we are happy to say that in our December number, which the writer could not have seen, we used the identical digram which is found in the margin to illustrate the subject, in a manner capable of universal application, and substantially as he explains it in this communication; it differs only in the lettering. True, we did not call it a "bent lever." We do not like the term, and do not purpose to use it. Mathematics, strictly speaking, recognizes no such mechanism, but resolves all levers ultimately into straight lines. [See our last month's journal, p. 347.]

[4.] We might have omitted "through C A," and as a matter of taste ought to have done so, for it is mere surplusage. We wished only to point out the direction of the line of economic power. We had already stated that "the power is in fact applied to the axis." If our language would lead the

careful reader to apply his power *to the circumference of the wheel,* it would be false teaching. We did not dream of any such interpretation.

[5.] We have not treated of the "collar," nor the yoke, nor of breastplates, nor other parts of the harness, belonging to horses, oxen, or other motive powers, thus far; but when we do, we shall inquire of teamsters, stable keepers, and such like, and not of mathematicians nor professors. All they know, or think they know, has been obtained from these sources, and we prefer to go to the fountain. The printer has in hand a paper, which we gave him several days ago, in which these matters are alluded to, but we may write more definitely hereafter.

We have thus, "in justice to" our friend, printed his views of this subject, and "in justice to [ourself and] our readers," we have added remarks of our own.

FATTENING OF HOGS.

The following useful hints on the care and management of hogs during the time of fattening, we extract from the *American Farmer:*

Attached to the pen, there should be a good covered shed, with a plank floor for them to sleep on, or retire to, in wet weather. This shed should be divided into two departments—the one for feeding in, and the other for sleeping in. Attached to it there should be an inclosed yard, its size to correspond with the number of your hogs. Over the floor of this yard spread to the depth of ten or twelve inches rough materials, as marsh mud, wood mould, or any similar substance. Over this, twice or thrice a week, sow plaster or pulverized charcoal. Every two years, after your hogs are put up for fattening, clear out this yard and put in an equal quantity of rough materials; continue this practice until you have killed your hogs, and you will be able to obtain from twenty hogs, if you keep the manure out of the weather, or so pack it up in bulk as to turn the water, as will manure you as many acres of land. This is not an exaggerated statement, and will not be so considered by those who reflect that there are nearly 5 pounds of *urea* in every 100 pints of hog *urine,* and that there are nearly 3 lbs. in his solid excretions; that every pound of urea is resolvable into so much ammonia, and that this mixed manure yields in every 100 lbs., of potash, 7 lbs., of the sulphate of soda, 19 lbs., of the phosphate of soda, and of lime and magnesia, 8 lbs. 8 oz. We say that those who reflect that the excretions of the fattening hog are thus rich in the elemental food of plants, will not consider what we say in behalf of the value of the voidings of the hog as manure, to be in the least exaggerated.

While the hogs are undergoing the process of fattening, corn should be scattered daily over the yard, to induce them to root for it; for, in so doing, they will turn over and mix the excretions with rough material, and thus aid in the absorption of the former by the latter.

The material from the hog-yard, whenever cleaned out, should be thrown into bulk, in such form as will turn water, and then compressed with the back of the shovel, and have fresh portions of plaster, or powdered charcoal, added to it, and dusted over the surface of the heap.

When first penned to fatten, they should for three or four days, at intervals of a day apart, have mixed with their food, which should be soft, in the proportion of a teaspoonful of sulphur, and half a teaspoonful of copperas, for each hog.

Their food for the first week or ten days should be mainly pumpkins, roots,

apples or vegetables of some kind, mixed with a small portion of corn meal, which should be cooked. As the feeding progresses, increase the quantity of meal. The last three weeks of the fattening, the hogs should be fed on cooked corn meal.

Their beds should be provided with straw or leaves, which should be cleaned out and renewed once a week.

Each yard wherein hogs are fattened should be provided with a rubbing-post, for the hogs to rub themselves against, and a trough in which should be constantly kept charcoal, rotten wood, ashes and salt.

A QUESTION FOR THE CURIOUS.

Every one has noticed that when water is emptied through a funnel, it assumes a rotatory motion, and, as if urged on by a centrifugal force, retreats from a certain space in the centre of the funnel, producing a void, of a cylindrical or conical shape. Can any one explain this?

We only make a suggestion or two in relation to it. It has been said, *and printed*, that this is the result of the revolution of the earth, and is always of course in one direction. We are confident, by ocular demonstration, that this is not so. The revolution is not always in one direction. Again, it has been said that it is from the impulse the fluid receives in descending along the surface of the funnel. But the shape of the funnel does not appear to make any difference. No matter whether it is conical or not, wherever water flows from a circular orifice in the bottom of a vessel, the phenomenon is seen. Does it not, in fact, occur sometimes in a watering trough? We think so, but would not be too confident. Has the shape of the outlet any thing to do with this matter? If so, how, and if not, what is the cause of the phenomenon? We pause for a reply.

KEEPING APPLES.

Mr. Pell of Ulster county, the celebrated exporter of apples to Europe, recommends that apples, after having been carefully hand-picked in baskets, should be laid on a floor by hand, without pouring from the baskets, until they are from fifteen to eighteen inches deep, and left to dry and season three weeks; when again carefully packed in clean barrels, they may be kept without rotting, any reasonable length of time, and safely sent to any part of Europe or the East Indies. The plan of drying and seasoning in the air, before barrelling, prevailed generally some years ago, although now-a-days, it is mostly discontinued and thought useless. We are disposed to think well of this process when it becomes important to keep apples safely till next spring, to send to foreign countries; for we have always observed that on opening a barrel a few days after being put up, in ever so dry weather, that the moisture often stands in drops over whole surfaces, and although loose barrels will allow it mostly to evaporate, yet where they come in contact, the two surfaces retain it and cause rot.

The carrying of apples in a common wagon, either before or after barrelling, is injurious. They should be moved on springs or sleds. The least abrasion

of the skin, or crushing of the cell of the pulp containing the juice, allows fermentation and decomposition, and the consequent decay of the whole mass.

Apples will not freeze until at a temperature of from 5 to 10 degrees below the freezing point of water; and it is beneficial to keep them as cool as possible, even down to 30 degrees. Apples inclosed in a water-tight cask may be left in a cold loft all winter without further care, and will be sound in the spring and perfectly fresh.—*Genesee Farmer.*

FOR THE PLOUGH, THE LOOM, AND THE ANVIL.

STEAMBOAT BILL—SECURITIES AGAINST ACCIDENTS.

This bill originated through Senator Davis, in the Senate, in the Thirty-second Congress, first session. It is said to have received many important amendments in the House. Upon the whole, this bill, which was matured into a law, was the Magna Charta of that tedious session of ten months. In this law the public are well requited for the expense of the whole session. The law will at least awaken a spirit of inquiry among our engine-builders, which will progress and improve, until the public can rely safely upon travelling in steamboats without being alarmed at the former recklessness of human life attending this means of travelling. The law is quite voluminous, but affords an ample panoply, if faithfully executed, against accidents in every way incident to and common with steamboating.

And now, Messrs. Editors, let me be excused the task of penning here the provisions of this salutary law, which would necessarily spin out this notice to an unpardonable prolixity. I will merely refer your numerous and intelligent readers to the law itself; and then, for the benefit of those who may be curious to know how the law is to be executed, merely hint at what may be some of the means employed to that effect. This, however, I ought to say, is mere supposition, for I have no warranty for it. That a "water indicator," such as was made by Alfred Guthrie, Esquire, of Chicago, Illinois, who, by the by, is a connoisseur in engineering, will be adopted; the object of it being to show to passengers the state of the boilers in respect to water. When there is plenty of water in the boiler, the indicator is so mechanically arranged, that a card is displayed with the sign, "Good water." When the water falls too low, a card, "Dangerous," is pushed up over the other. This is shown outside of all machinery. It is well known that a defective supply of water has been the cause of most explosions; for a defective supply of water leads to the overheating of flues, and the result is, they are made soft and weak. Then, when cold water is suddenly injected on the red-hot plates, a sudden increase of steam and pressure is the result, which forces the boiler to pieces like gunpowder. Mr. Guthrie has likewise invented a "Steam Indicator," operated by the pressure of steam, made to raise a piston with weights. The machinery is so constructed, that by cylinders indexed, the number of times the water or steam has been "dangerous" on a trip will be known at the different points on the voyage. These indicators are to be locked up against all interference of any person except the government.

Inspectors.—These inspectors are to have the same charge of the indicators that proper persons now have of the keys of the mails. The plan of operation is given by Mr. Guthrie thus: "We will suppose a steamboat at St. Louis, ready to depart for New-Orleans. The inspector is notified of the fact,

repairs on board, and makes a proper inspection of the boilers, engines, and machinery, and finds they bear the relative proportions, with the proper pumping apparatus, free and unobstructed passages, and all in good order. But he finds the boilers are old and somewhat worn; or in the hydrostatic pressure, he finds that it will not be safe to run these boilers under a higher pressure than say fifty-five pounds to the square inch. He then says to the engineer, You may run with this pressure and no more; you may also run when the water is full three inches above the flues, and no lower. He then repairs to the cabin, adjusts the indicators to the precise limits, (which is done in a moment,) locks up the indicators, and retains the keys. Between the two indicators he places his permit, and the boat is allowed to depart. Suppose the boat has proceeded on her voyage as far as Memphis, and during this time the engineer has had "dangerous steam" or "dangerous water," and none of the passengers are disposed to prosecute him for the penalty in his bond. It will be the duty of the local inspector there to repair on board and unlock the indicators, examine the secret register, giving the exact number of times that "dangerous water" or "dangerous steam" has occurred since the departure from St. Louis, and if he should consider it unsafe to allow the engineer to continue in charge, he substitutes another in his stead. Add to this the facts that, as the engineers and pilots act upon certificates of capacity given them by the inspectors, they are responsible for any damage done, if they transcend the order of the inspectors; and if the owner or master of the boat is informed of the fact, and allows such violation of order, he becomes personally responsible; the whole showing that the effect of the law has a direct practical bearing on the interests of the community. May we not then trust that the provisions of this humane law, carried out as intended by its makers, will put an end to that destruction of life which we have often had cause to lament? A. L. B.

Mill Bend, Tenn., Dec., 1852.

HOW TO KEEP SHEEP.

"Uncle Billy," writing in the *Ohio Cultivator*, says:

A large majority of the farmers of Ohio think that, give a sheep grass during the spring, summer and autumn months, hay during the early part of the winter, and hay and grain towards spring; if they die from poverty in the spring, as many of them do, it is attributed to bad luck. The unlucky man will say that he feeds his sheep all the grain they want in February and March, and they still go down in flesh, and many of them die, while those belonging to his neighbor get through these trying months on half the grain, and keep in good flesh. Why is it? It must be luck. Now if the unlucky man will look at his neighbor's sheep occasionally in the months of November and December, he will find them on good feed and looking strong. His lucky neighbor will tell him that when the frosts come in the fall, the pastures fail in substance, and this is the time sheep require care and attention. They should have some good hay and a little grain. A sheep to endure the approaching winter should be provided as well with a coat of flesh as of wool. If he goes into the winter strong, it is easy to bring him out strong in the spring; but if he is thin in flesh in the fall, all the grain that can be given will not bring him up. A peck in December is better than a bushel in March—an ounce of prevention is better than a pound of cure. But the un-

lucky man will say his sheep will not eat hay; he carried them an armful a few days ago, and they ran over it and trampled it into the mud; as for grain, he never thought it necessary to be given until February, when sheep got weak.

Now if the unlucky man will put his hay in racks to prevent its being trampled under foot, and will adopt his neighbor's mode of feeding, he will find in March that there is more in management than in luck.

REPORTS ON PEACH TREES.

We are desirous of doing all that we can to secure a sure growth and a suitable cultivation of this fruit, which is not surpassed, we think, in the Northern States, by any species, and have extracted from the reports of Committees of the American Pomological Society, made at a meeting held in Philadelphia in September last, what they communicated on this subject. We place the remarks of the committees under their several States.

New-York.—Coming from New-Hampshire, a State which had hardly grown peaches, I remember with what zest I ate the first peach I ever saw at Rochester, and it is a fact worth remembrance that 35 years ago the Royal Kensington Peach was grown in the virgin soil of Monroe, then Genesee county.

My father, in the year 1817, purchased the first dozen of peaches which he saw there, and as he had just located what he deemed his home lot, he with great care kept and planted the *pits* of the peaches mentioned.

From them seven fine thrifty trees sprung up, which at their bearing proved identical with the peaches he bought, and which were the Royal Kensington variety.

Those trees were moved to another lot, and most of them lived 25 years, fine bearing trees, and the variety was very generally propagated from them.

It is also within my recollection that a tree of the Yellow Melacoton variety was grown in a neighbor's yard, which produced the best fruit of that kind I have ever seen.

That was also a seedling tree.

It is also well remembered that so spontaneously did the peach tree grow there, and so plenty was the fruit as early as 1821 to 1825, that growers many times have thrown their peaches from their market wagons into the river, sooner than sell them less than twenty cents per bushel.

It may be asked why peaches now command in ordinary seasons at this point from two to three dollars per basket.

It is because a second planting of trees did not take place till very recently, and that the trees are more or less affected by the disease known as the *yellows*, and by the depredations of the *borer*, which all growers should know and exterminate from the roots.

Our seasons vary so much, and the country has been cleared of the forests to such an extent, (except in some locations,) that a good crop cannot at all times be depended upon. Near Lake Ontario, within a few miles of Rochester, in the light soil of that region, the best peaches are grown. This season, from the late spring and inclemency of the weather in cold rains, &c., &c., the crop will prove a failure. The *heading-in system* for the renewal of

the trees, as recommended, is highly approved by all attentive observers, and carried out to a great extent.

N. B.—It is notorious that the yellows mentioned was first introduced there in trees imported from New-Jersey.

Hard winters often injure the trees, and from different causes they are short-lived now in the latitude of Rochester, 43°.

PENNSYLVANIA.—Peaches have done but ill with us for some years past. The yellows has swept off thousands of trees, and those remaining are weakened so much by the curled leaf in spring (as plums are by leaf-blight) that we rarely enjoy good peaches. We have some hope that we are through the worst in regard to these diseases.

VIRGINIA.—Peaches.—We have great abundance in most seasons, as the trees have succeeded here well—many of them 30 to 40 years old. The yellows appears in some places, and where no means are used to check its progress, it has destroyed some orchards entirely; but where proper measures are resorted to, it has been checked altogether, and no doubt but that a simultaneous exertion on the part of all would effectually remove the disease from amongst us. The past winter here was one of unusual severity, the thermometer indicating from 10° to 14° below zero, and at least one half of our peach buds were killed in the winter, and the crop consequently light this season.

DISTRICT OF COLUMBIA.—The peach crop is below an average. This failure is to be attributed, in part, to the destruction of the buds in winter, partly to spring frosts, and partly to the excess of wet weather during a portion of July and the whole of August, (a statement of the quantity of rain for each of the last six months accompanies this report,) causing many to rot and fall; and though it added much to the size of the fruit, there was evidently a great deterioration in the quality, showing plainly the importance of hot sunshine in perfecting the juices and flavor.

SOUTH CAROLINA.—We have had a bountiful supply of apples and peaches. They were every thing that could be desired; but as I have not time to particularize, I must bring this hasty note to a close.

KENTUCKY.—After some personal investigation upon this subject, and the collation of many communicated facts, the committee are strongly inclined to believe that although intense cold of long duration may sometimes destroy even the life of a tree, by rupture of its tissues from the expansive force of congelation, yet far the greater number of injuries experienced by the cultivator, either in health of his trees or in the thrift of his crops, are traceable to the agency of comparatively moderate cold brought to bear upon vegetable life in a state highly susceptible of harm by reason of the presence of fluids in a state of circulation, or of fluids upon the surface of the leaves and branches, or of fluids in a state of saturation in the soil containing the roots. In confirmation of this opinion, they refer to the following facts, viz.: The winter just passed has been one of marked severity in the West, and the character of the past spring too was distinguished by some of the most peculiar features of a changeable climate, affording thus a good opportunity for a comparison of the destructive force of intense cold and that of unseasonable cold. The committee find it difficult to refer some casualties reported to the cause of harm, whilst in regard to others there seems not a shade of doubt in fixing upon the destroying agency. Thus, one gentleman had a large peach orchard which in the spring he found dead, each tree alive in its roots and for a space up the trunk about as high as the surface of the snow at the time the mercury went to eighteen degrees below zero. This destruc-

tion would seem like the work of intense cold, but many other orchards stood the same degree of cold, receiving but little injury other than the loss of the crop, which evidently occurred at this time. Whether in this case there was present the condition of a wet soil to aggravate the force of cold, or such a conformation of the earth as to generate a more intense degree of cold than elsewhere, the committee are unable to say. In regard to the effects of the spring upon vegetable life, proofs are more numerous and far less equivocal. On the 18th of March, the fruit crop, except peaches, was fast coming forward; apricots had partially bloomed; some apples and pears had in their fruit buds made considerable development, leaves being formed; the blossom buds of the plum were very vigorous and healthy, and the latest had swollen till the coiled petals were visible. At this time the thermometer sank to thirteen degrees above zero, a temperature thirty-one degrees warmer than that of January; yet the harm resulting from the temperature at thirteen above zero has been tenfold greater, the committee think, than that which was caused in January by eighteen below. Bolmar's Washington and Duane's Purple plums in some places, although swelling to bloom, were so effectually killed as to show no more signs of growth; many varieties of the plum on the same grounds bloomed but cast their fruit; some pears and apples had every fruit and wood bud killed so as to slough off, the same trees afterward pushing forth adventitious buds and making a new coat of leaves. The hardy willow, which had remained unhurt after the zero spell in January, and was pushing into leaf even to the points of the branches in March, lost in some places every wood bud in the system, together with the extremities of the branches for full six feet in from the points. As for Heart Cherries, although almost ready to bloom, they were literally swept out of existence; one gentleman, with an orchard containing sixteen varieties, had only the Ox Heart and two other sorts left, whilst, as if to prove there was no security in sorts, his neighbor lost all his Ox Hearts at the same time. Again, on the 1st of May, 1851, the fruit crop from the Lakes as far south as we have heard was one of the most abundant and most promising ever looked upon. At this time a fall of the mercury to a temperature ranging from 20 to 26 degrees carried off the whole fruit crop except in a few places peculiarly located, where we believe local causes always exist capable of preventing this wide range of the thermometer, unless in very rare cases, when (as Dr. Kirtland has said in one of the best articles on this subject which has yet been printed) the general cold prevails over the local warmth, as was the case in January last, when the mercury could not rise on the noon of a bright sunny day. Such favored situations, the committee believe, are found in belts of land around bays and lakes, on small islands, and upon elevated points.

Michigan.—Some attention has been given to the cultivation of the peach, but not so much to the finer sorts as we could wish. We have often seen in our markets wagon-loads of poor peaches selling at 50 and 75 cents a bushel, while the very few fine peaches were selling at $1.50 and $2.00 a bushel.

Peach trees do not grow so rapidly on our clay soil as upon the sand, but they are more hardy, bear heavier crops, and are less liable to injury by worms at the roots.

Peach trees in this vicinity were somewhat injured by the severity of the last winter; but the theory that peach trees will not blossom when the mercury falls to 12° below zero we think is now proved to be incorrect, for during the last winter the thermometer several times indicated a greater degree of cold than 12° below zero, yet we never saw the peach, apricot and nectarine trees blossom more profusely than they did the last spring. It is

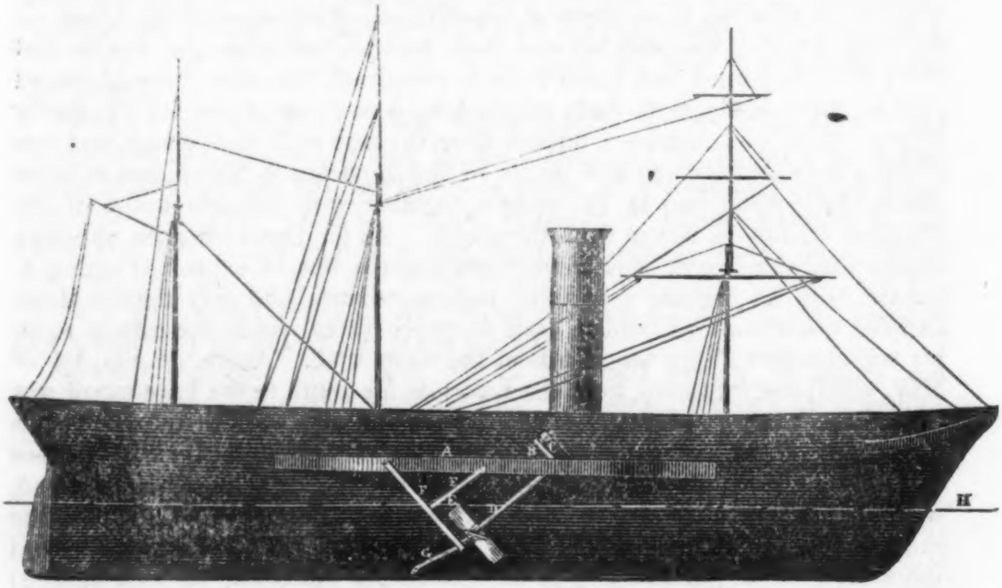
true that, in some instances, not only the blossoms fell, but the trees themselves soon dropped their leaves, withered and died. In the nursery, the peach stocks that were budded last fall looked very promising early in the spring, but they did not start, and we were obliged to cut down several thousand and bud them again this season. All our young peach trees are perfectly healthy, and never grew more vigorously than they do the present season.

We have never known a peach tree in this vicinity to be attacked by the yellows, but the leaf curl has been some little annoyance to us.

Our peach crop will not be great this season, but very fair.

Illinois.—The last winter was severe; however, the trees generally escaped injury, but the fruit did not. There are no peaches, few pears and cherries, and but a moderate crop of apples.

WILSON'S NEW PROPELLER.



We give our readers a description and an engraving of this new arrangement. It differs in essential particulars from those already in use, and these differences to us appear valuable.

The propeller is constructed in any of the known forms that will allow of total immersion, as represented in figure 1, the propeller being submerged below the water line, H. It is placed at the ship's side at an angle that may vary from perpendicular to 45° from the horizon, as represented. The object of placing the propeller in this position is to obtain an application of force to produce the greatest speed in the most simple manner. A is a guard secured on the side of the ship B; C is the crank of the propeller

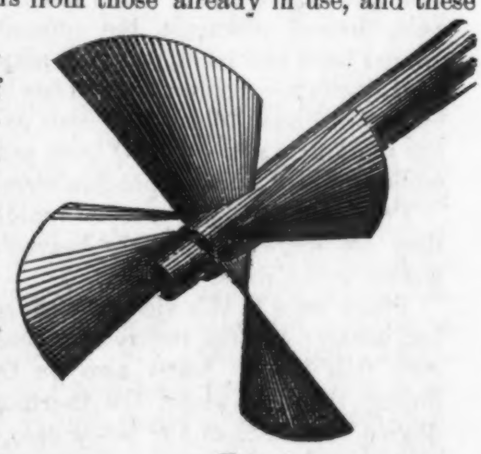


Fig. 2.

shaft D; E is the propeller; its low journal runs in a bearing box in the brace F′; G and P are also braces. The crank is attached to the end of a connecting rod of the piston rod, the cylinder being placed athwart the ship. The same arrangement is attached to the other side of the vessel. The propeller is moved by the direct action of the engine.

One advantage of placing propellers at the side, instead of the stern of the ship, is, that at the side there is no current of water to be overcome by the speed of the wheel or propeller blades. With a stern propeller the speed of the water rushing in to fill the vacaum left by the passage of the ship in the water, must be overcome by the propeller before it can exert any influence in moving the ship. Another improvement consists in this: Stern propellers cannot be readily unshipped for repairs at sea, while the "new propeller" can be taken on deck at any time, repaired and replaced. The force of this mechahism is applied at the centre of gravity of the ship, which seems to be a very philosophical arrangement. In natural motion, as that of the heavenly bodies, while gravitation is inherent in every particle of matter, the efficiency of the whole mass is resolvable into force applied at this one point, the centre of gravity. The inventor was led by this view of the subject to apply his power at the same points.

As to the angle of inclination to be given to this mechanism, experience will be the wisest counsellor. Mechanics is made up very much of mathematical computations, and, of course, is so far a simple matter of demonstration, independent of experience. But we have less confidence in some of the "mathematics" of these mixed sciences than we used to have. Our author has chosen 45° as his angle of inclination. Perhaps this is wise. There seems to be some "natural magic" connected with 45°. Thus, the books tell us that a roof with this inclination sheds the rain better than any other, and also that "the rain will run quickest off it;" we must confess that we fail to believe all this, at least while we believe certain other propositions which are uttered by the same authority, and seem to contradict these specific statements. But, however this may be, the comparative efficiency of this inclination, under the numerous and constantly changing conditions which affect it, will be and can be demonstrated only by experience. If we varied from this angle, it would be to lift less and drive more.

GUANO OR A SUBSTITUTE.

It is a great practical question for our agriculturists, whether any substitute can be found equal in quality to the best Guano. A writer of great experience, in the *Gardener's Chronicle*, Eng., says:

Let us consider the nature of this substance, and the processes by which it is secreted, and then judge for ourselves. Guano is the excrementitious deposit from myriads of cormorants, flamingoes, cranes, &c., whose food is exclusively sea-fish, found in the highest perfection on the granite rocks or islands, ten miles from Chincha, off the coast of Peru. Little or no rain there falls, and the sun's rays exert great desiccating effects. Guano, therefore, must be found very different from, if not greatly superior to, the fæcal matter excreted by man or the mammalia, inasmuch as the urine and dung of that class of animals are evacuated separately, whereas in birds the excre-

tions of the kidneys and intestines are both contained in the fæces. Guano ought also to be a richer manure than the excrements of man or of animals, on account of its being produced by sea-fowl, which live solely on fish, without admixture of vegetable matter. Now, if the philosophic chemist reflect deeply upon the above facts, will it not become evident that a manure equal and responding to guano can never be produced at home, unless prepared from substances that shall combine every one of the elements in which that manure abounds? Let the reader peruse Dr. Ure's paper, commencing Vol. V., p. 287, of the Royal Agricultural Journal, and then reflect how we could produce—first, that great bulk of what the writer called undefined organic matter, the origin of his potential ammonia; then, the large percentage of the bone-phosphate of fish, in a condition of inimitably fine subdivision; then the important urate of ammonia; and lastly, the various soluble salts with ammoniacal and alkaline bases. I despair not; but assuredly, unless the chemist can discover a compound uniting in itself all the requisite ingredients, and the operator be able to produce any required quantity of the same, in a state of mechanical subdivision of particles conformable to that of guano, and at a cost not exceeding the stipulated 5*l.* per ton, we have little to expect in the way of successful competition.

THEORY OF PRUNING.

Mr. Lawrence Young, of Louisville, Ky., closes a series of interesting articles upon this subject, which have appeared in the *Horticulturist*, by summing up with a few comments upon certain of the processes in the art of pruning and training, which in a former number he has styled debilitants of the wood-producing force. These processes are:

1. Stinting supplies of food.
2. Neglected cultivation.
3. Retarding the circulation.
4. Breaking the circuit of circulation.

The first of these processes comprises the two very common expedients now practised to superinduce a state of fruitfulness—root pruning and dwarf working. Every tree at the extreme points of its rootlets receives its supplies of food, which there enter into the circulation by reason of the mysterious attraction of the thicker sap within for the thinner fluids without, (by *endosmose;*) and nothing is plainer than the fact that, other things being equal, the size and vigor of trees and plants are, to each other in proportion to their number of spongioles and the space they pervade. It is impossible, therefore, to diminish the number of these rootlets, or the area over which they range, without lessening also the amount of food carried into their general circulation, and by consequence the share of each bud. The effect of this operation is very generally understood and appreciated, and also its application as a means of superinducing fruitfulness. Mutilation of the roots (and root pruning is only mutilation, nothing more or less) lies at the foundation of that very salutary rule, heading-back the branches when large trees are transplanted. In this case the demand for food is reduced until the enfeebled condition of the rootlets can meet the requisition.

Most fruit trees and many plants are liable to a catastrophe which might be termed, not inaptly, accidental pruning. I refer to that strangulation or suffocation of the rootlets resulting from seething and baking rains, experienced

in hot seasons. A visitation of this kind often seems to arrest the circulation and to bring on a premature decline and fall of the leaf. The cherry, apricot, and plum are most liable to this affection. Sometimes, however, the apple and pear are not exempt. I have myself witnessed instances in which the Rousselette de Rheims, after making shoots four to six feet in length in the early part of the season, and losing its leaves in July and August, has formed sessile fruit buds through the whole extent of such branches, producing thereon a wreath of fruits in the following season. I do not mean to say the fruitlets would be without peduncles, but the clusters without spurs, which is their usual appendage.

Dwarfing fruit trees by propagating them upon small growing stocks, is only another method of stinting supplies of food. In this case we avoid the necessity of resorting to artificial means to diminish the system of roots, by making choice of stocks whose roots are naturally small; and it appears to me that the whole claim of this practice to favorable regard rests upon the following considerations only, and not upon any mysterious agency exerted by the stock upon the habits of the graft: 1st. It enables the amateur to cultivate a large number of varieties within a small compass. 2d. Fruits upon dwarf trees, like clusters of the grape upon branches from which the wood-producing force has been removed by amputation, have control of the circulation, and are for this reason larger and finer than upon trees where the wood growth is more active. 3d. Dwarfing simplifies fruit culture: the whole business of cultivation is to stimulate; the balance of power is at all times against wood growth. One must cultivate and manure, must thin and shorten-in. An ordinary fruit tree, when inserted upon a dwarf stock, is not unlike the fox in the fable, at the feast of the storks—its food has to be reached through such diminutive tubes ("such long, narrow-necked vessels") that there is no danger of growing to excess.

Neglected cultivation, although enumerated in the books as a means of inducing fruitfulnes, does not deserve favor, and should always give place in the orchard culture of standards upon their own stocks to retarding the circulation, by bending down the branches. I believe, with Jeffries, that precocity should never be encouraged, but believe this method of hastening the bearing state to be attended with fewer evil consequences than almost any other. Suppose the top of a young tree to consist of a few straight switches; these, if bent to a horizontal position, will form fruit buds at the points in a year or two, whilst dormant or adventitious ends will put forth at the bases of such switches and refill the centre with upright wood growth, the tree forming a head as rapidly and often with more symmetry than though the branches had not been bent.

Breaking the circuit of circulation is effected by ringing the branches. This ringing, when not so thorough as to produce the death of the parts cut off by the ring, not only induces fruitfulness, but very often adds brilliancy to the hues of colored fruits. Pinching or cutting off tender shoots and heading-back branches in full leaf are operations of a nature very similar to ringing. In many such cases the circuit of circulation is interrupted for a time, and the roots, after undergoing the labor of sending up the material which has formed the amputated branches, never can receive an equivalent, since by the act of amputation the organs which should have digested this equivalent of food are destroyed. It is this debilitating tendency in the practice of stripping off the leaves and growing branches which renders the operation of shortening-in, in the month of August, conducive to fruitfulness, a result exactly opposite to that of the same operation if applied in February or March.

CENSUS RETURNS, 1850.

In our July number we gave a short table of agricultural values. We have lately receceived more extensive reports, and find a trifling difference in the amounts given. Whence these differences arose we do not understand, and though they are small, those returns were but partial in the variety of details; we give some of them again with additional information. They may be very useful as a reference, thus embodied and compared.

The amount of several crops in the United States are set down as follows:

Wheat,	100,503,899	bush.
Rye,	14,188,639	"
Indian Corn,	592,326,612	"
Oats,	146,567,879	"
Rice,	215,312,710	lbs.
Tobacco,	199,752,646	"
Ginned Cotton,	907,448,400	"
	(or 2,468,624 bales of 400 lbs.)	
Peas and Beans,	9,219,975	bush.
Irish Potatoes,	65,796,793	"
Sweet Potatoes,	38,259,196	"
Barley,	5,167,016	"
Buckwheat,	8,956,916	"
Butter,	313,266,962	lbs.
Cheese,	105,535,219	"
Hay,	13,838,579	tons.
Maple Sugar,	34,249,886	lbs.
Cane "	247,581,000	"
Molasses,	12,700,606	galls.
Beeswax and Honey,	14,753,857	lbs.

Assuming what we suppose to be a fair average price of wheat, corn, and cotton, in the New-Orleans market, we find the annual value of these crops to be, in round numbers, as follows:

Indian corn at 45 cts.,	$261,550,000
Ginned cotton at 10 cts.,	90,750,000
Wheat at 70 cts.,	70,350,000

We purpose hereafter to give sundry calculations respecting the net gain as well as gross income from sundry manufactures, which, by a comparative view, will satisfy those, if any, who are now in doubt of the primary importance of these various trades.

As to Population, the following table shows the actual and relative increase of the classes named, from 1840 to 1850:

Total population,	36.25	per cent.
White, "	38.28	"
Slaves, "	28.58	"
Free colored,	10.90	"

The total number of immigrants arriving from 1840 to 1850, is 1,542,850; whole number since 1790 and their descendants, 4,350,934.

The number of inhabitants to a square mile varies greatly in different States; among the most dense are the following: Massachusetts, 126.11; Rhode Island, 108.05; Connecticut, 79.83; New-York, 67.66; Maryland, 62.31; New-Jersey, 60.04. Among the most sparse are Oregon, 0.03;

Minnesota, 0.07; Texas, 0.89; Florida, 1.47; Iowa, 3.77; Wisconsin, 5.65; Arkansas, 4.01; Michigan, 7.07; Missouri, 10.18; Louisiana, 11.02; Mississippi, 12.86.

We find the following table in *De Bow's Review*, from which we also extract the two tables preceding:

In the six New-England States, the population per square mile is 43.07; six Middle States, including Maryland, Delaware and Ohio, 57.02; six coast planting States, 12.36; six central slave States, 16.75; five Northwestern States, 10.92.

BEARING YEARS OF FRUIT TREES.

We have ever been strongly inclined to the belief that if fruit trees are properly managed, they will bear fruit every year. It is strange that it should be otherwise, and numerous facts distinctly point to the difficulty in the way of securing this result. We accidentally came across a statement of the Hon. J. W. Proctor, of Danvers, Mass., on this subject, which we here transcribe. Mr. P. says: "I will state certain facts that have come within my own observation. I know a Baldwin apple tree, that has been in bearing condition about thirty years, which uniformly bears from five to ten barrels each year. It stands about one hundred feet westerly of a large barn, and about thirty feet from the road. Directly opposite the tree is a gutter, that takes the wash of the road. The proximity to the barn-yard and the highway affords all the nutriment to the tree that can be desired. Whether these are the causes of its constant productiveness, I will not say; but presume that they are. If they are, the fact has a tendency to show, that in good positions, with good culture, trees may be made to be constant bearers; and that their intermission in bearing is to be attributed to the exhaustion of their qualities, and not to any general law that forbids their bearing every year. I know another tree that bears a superior fall Harvey, that has borne constantly, every year, for more than twenty years. . . . If by culture and attention trees can be made to produce every other year, it is a fact important to be established."

From published accounts of Mr. R. L. Pell's orchard management, (and he is the owner of the largest and most productive apple orchard in the country,) he has *established the fact*, that apple trees may be made to bear every year by supplying the necessary food for the trees and fruit. The compost he manures his orchard lands with is not made by *guess*, but is compounded with reference to the kinds and quantities of elementary substances composing the wood, bark, leaf and fruit of the trees, as deduced from analyses. A plant can be fed with its appropriate food, as well as an animal.

WOOLLEN RAGS AS A MANURE.

The following experiment was tried by a farmer in Toronto, C. W. The soil was light yellow sand, and had been cropped with wheat the year previous and sowed with clover, which had not, however, taken:

I planted the piece, he says, just one third of an acre, part on the 10th of May, and the other part about the 20th, in rows three feet apart, putting the sets one foot apart. They would, I think, have produced more if only

eight or nine inches apart. I first drew the rows, and then, after cutting them up, scatterred the rags, at the rate of one ton to the acre, dry, in just the state I saved them, in the rows, and dropped my sets *on the rags*, covering them up in the usual manner. I hoed them three times, and the product is just 75½ bushels of the largest and best Pink-Eye potatoes I ever saw. The rags now appear but little decomposed. I purposely left two rows without rags; the difference in the appearance of the potatoes during their growth, and in the quality and quantity of the product, was very striking. I have just formed a manure heap, as follows: first a layer of horse dung and litter; then a layer of woollen rags; then a layer of spent lime; then another layer of rags; continuing thus to the top, on which I put a heavy coat of the same as at the bottom. With it I intend dressing my garden in the spring. The piece on which I used the rags the present year, I intend again to plant with potatoes next year.

GREAT PRICES FOR FANCY POULTRY.

Within three months, extra samples of two years old fowls, of the large Chinese varieties, have been sold in Massachusetts at $100 the pair. Several pairs have commanded $50 a pair, within the last six months. A trio of White Shanghaes were recently sold in Boston for $45. And the best specimens of Shanghaes and Cochin China fowls now bring $20 to $25 a pair readily, to purchasers at the South and West.

At the Boston Fowl Exhibition, in September, 1852, three Cochin Chinas were sold at $100. A pair of Gray Chittagongs were sold at $50; two Canton Chinese fowls at $80; three Gray Shanghae chicks, at $75; three White Shanghaes at $65; six White Shanghae chickens, $40 to $45, &c.; and these prices for similar samples could now be obtained again and again.

SEASON—CPOPS IN NORTHERN WISCONSIN.

A writer in the *Rural New-Yorker* gives the following account of the crops of Wisconsin:

Like our sister and neighboring State of Michigan, we have suffered from extreme drought. It did not, however, commence until the month of June, since which time we have had scarcely rain enough to moisten the ground but a few inches in depth. Our crops have suffered materially, but not to the extent that they have in other States.

As yet, we depend upon native meadows for our hay crop, and these yielded a better crop of hay in consequence of the drought, than they would have done had the season been wet, as for two years past. The rains fille them in the spring, and, evaporation going on slowly, caused a great growth of grass. Upon the high lands where native grasses have been cultivated the yield was light. Winter wheat suffered both from winter kill and blight, and the yield will be below the average; the statements of Wisconsin editors to the contrary notwithstanding.

Many kinds of spring wheat have done well, particularly Canada Club, and Tea Wheat. Oats are light, in both straw and berry, but an average crop. Potatoes are good, and not affected as yet with the rot. Corn, after

laboring under many difficulties, has produced a tolerable yield. The coldness of the spring, and the imperfect nature of much of the seed planted, caused the plants of the corn to be very backward, and then the drought combined, tended to keep back the crop to such a degree, that although we had no frost until September 15th, very many fields were quite unripe. In general, our corn crop is ripe before the middle of September. But notwithstanding, we think the drought will be quite an advantage to our stiff clayey soils, which, in consequence of the heavy rains for two years past, had become hard and compact.

In our infant settlements we have not been able as yet to subsoil or drain, but the advantages of deep ploughing above those of shallow are nearly as conspicuous as those mentioned by friend Cone of Michigan. The great trouble in our western farming is the rage to cultivate a large number of acres, but the evil is curing itself. Our farmers are turning their attention to a diversity of operations, and do not depend so much upon wheat growing; and nothing does so much to remedy this evil as the circulation of good agricultural periodicals, of which every farmer ought to be in the possession of at least one.

STATE CHEMIST.

The *Hampshire and Franklin Express*, one of our best exchanges, has a good article on the subject of promoting scientific agriculture. We endorse every word of it. He says:

The farmers of this State should demand of the government a Chemical Laboratory, and the employment of a chemist to analyze their soils. If the laboratory should be connected with a farm school, it would be all the better. The school, if well conducted, would be a great good to the whole community, and not merely to one interest. But the laboratory should be established, at all events. The chemist should be a *young* man, one who was a profound chemist at 20, who has been *enthusiastic* in that science ever since, and is now not more than 25 or 30 years old. He should be furnished with every requisite for the most searching investigation of soils; and he should be a *working* man, willing to work 300 days in a year at least, an enthusiast in his profession, one who, with a Liebig's zeal, and with the advantage of discoveries already made, would go further in his researches than Liebig or any of the older chemists have time of life enough left to go. He should investigate soils for farmers, report the deficiencies to them, and explain to them the cheapest mode of supplying those deficiencies. The result would be, that in ten years the farms of Massachusetts could be kept in high fertility with half the expense now required to keep them in only a tolerably productive condition. Proofs that such a result might be reasonably anticipated are abundant. One fact only will be given here, and others will be reserved for future occasions.

Mr. William P. Dickinson, of Hadley, had a field of eight acres thoroughly grown over with moss almost as thick and matted as the wool on the back of a sheep that will give a ten-pound fleece. The land of course must have been exceedingly unpromising for any crop. He procured an analysis of it by the late Professor Norton, and was told it was deficient in two or three ingredients which could be cheaply supplied. For the analysis and a long letter, advising how to supply the deficiencies in the cheapest possible manner, he paid ten dollars, and was laughed at, as commonly happens when a man ventures a step out of the beaten track. He ploughed that field and treated it in every

respect as Professor Norton advised, with the exception of here and there a couple of rows, which were cultivated as he would have cultivated the whole if he had not been otherwise advised. The result is, a crop of corn now in the field equal to perhaps twenty bushels to the acre where cultivated in the old way, and very near fifty where cultivated as Professor Norton advised. This, I know, all might have been, and yet there be no increase of profit, for the extra corn and fodder (both more than doubled) might have cost more than they are worth. But it was not so in this case. Mr. D., after keeping an exact account of the expense, gives it as his deliberate opinion, that the increased profit, in consequence of Mr. Norton's advice, is at least fifty dollars this year; and besides this, he has better hopes for that land hereafter, and has, moreover, several fields of similar land adjoining that, to which Mr. Norton's prescription will apply. He values the advice much higher than it cost, for its future application to each of those fields. Now may it not be desirable for farmers to pay for analyses?

OYSTER SHELLS FOR FRUIT TREES.

A correspondent writes to the *Germantown (Pa.) Telegraph* as follows:

One of the most effectual applications I have ever made to fruit trees in an old and barren situation, is a compost in which finely broken oyster shells were the principal ingredient. The shells have generally a large percentage of saline matter attached to them, in a fresh state, with some animal matter and much lime. By breaking them and mixing them with wood ashes, and spreading it thickly around old trees, an almost immediate and decided improvement will take place.

SHOULDER-SLIP IN HORSES.

Shoulder-slip consists of a rupture, and subsequent wasting of the fleshy fibres composing those muscles which lie outside the shoulder blade, but pass from it to the upper arm bone below. In a healthy condition, the action of these muscles consists in moving the arm bone backwards and forwards, and in keeping its upper end or head in connection with the body when weight falls upon the shoulder joint. The fleshy substance of the muscles is attached to sinews which pass outside of the joint, and add materially to its strength and security; but all motion in the sinews is promoted by muscular or fleshy contraction. If an injury (such as a strain, for instance) should lacerate the fleshy fibres, they cannot, of course, determine any action to their sinews, and the latter become so lax as not to retain the shoulder bones in their natural position during motion; the head of the upper arm bone, in short, slips outward from under the weight, which, if its fleshy and tendinous relations were intact, it would support and still keep its own proper situation. This rupture of muscular fibres is accompanied by wasting of the fibres themselves. This process is frequently observed in the animal frame, and occurs in parts which are from any cause deprived of their usual functions. The affected shoulder, under the disease in question, becomes consequently much diminished in size; and the wasting being for the most part confined to muscles outside the shoulder blade, the outline of this bone may sometimes be visibly seen. The outward rolling motion of the shoulder joint is greatest when the horse is going

down hill, and is sometimes so excessive in a trotting gait, that the animal seems in danger of falling. If sufficient time be allowed, and the horse not put to work too soon, he will usually recover from this affection. Months are sometimes required to insure complete restoration; and in addition to the rest needed, much benefit is derived from an occasional application of blisters to the whole outer surface covering the shoulder blade and shoulder joint.—*North British Agriculturist.*

THE PATENT OFFICE.

The following remarks and suggestions from the Secretary of the Interior in his recent Report, are deeply interesting to the public as well as to inventors. To present an illustrated history of American inventions and discoveries would be supplying a desideratum long felt by the mechanical genius of the country, and would also give point and efficacy to all future inventorial labors. The Secretary says:

"There is probably no bureau connected with the Government in whose operations the public at large feel a deeper interest than those of the Patent Office. It is inseparably associated with every interest of our country. The mechanic, the merchant, the manufacturer, and the farmer, are all concerned in every thing which diminishes the labor of production in any of the departments of industry. Our people are eminently practical and ingenious. They are constantly employed in the discovery of new means of accomplishing important results at a diminished rate of time, labor, and money. The steam-engine, the cotton gin, and the magnetic telegraph are striking and imperishable memorials of the success which has attended their efforts. In the early period of our history, when population was sparse and the prices of agricultural productions high, the labor of the country was directed mainly to the cultivation of the soil; but, as population progressively increases, more attention is devoted to mechanical pursuits and the invention of machinery by which the work of many may be accomplished by few. Not a day passes without furnishing some evidence of this fact in the form of applications for patents of important inventions and discoveries. The mechanical interest has therefore become one of great magnitude, and it is justly entitled to all the protection and assistance which can be bestowed by Congress consistently with the provisions of the Constitution.

"The general principle of our patent system seems to have met with universal approbation, and to have been attended with beneficent results in practice. Since the organization of the office in 1836, it has advanced with rapid strides. At that state one 'examining clerk' was enabled to make all the preliminary investigations which were required to ascertain whether the applicant was entitled to a patent; but such has been the increase of the business, that six principal examiners and as many assistants are not now able to keep pace with it. The number of models in the office on the first day of January, 1836, was 1,069. In the beginning of the year 1851, they had increased to 17,257; and at the close of the present year they will fall but little short of 23,000. If they should continue to increase in this proportion, making no allowance for the augmentation consequent on the increase of population, by the close of the present century they will amount to 150,000, and the whole of the present Patent Office edifice will not be sufficient for their convenient display. To provide against this contingency, as well as to accomplish other important

results, I respectfully propose that the Commissioner of Patents be required to have prepared for publication a careful analytical and descriptive index of all discoveries and inventions which have been patented, accompanied by accurate descriptions and drawings which will fully explain the principles and practical operation of the subject of the patent. The advantages of such a publication would be almost incalculable. It would not only perpetuate the invention or discovery, by avoiding the casualties by fire and other causes, but it would multiply and diffuse among the people at large the specifications and descriptions, and substantially bring home to every neighborhood to which a copy of the work might be sent the benefits of the Patent Office. In much the larger number of cases the necessity for preserving and displaying the models would be obviated. The pages of the published report would be a safer and more convenient depository for them than the cabinets of the Patent Office, and they would be accessible to everybody. Inventors in remote parts of the country would be placed on an equal footing with those residing near the seat of Government. When their thoughts were turned to a particular class of machinery, instead of being compelled to make a journey to Washington to see what had already been done in that department of the arts, they could at once turn to the analytical index and ascertain what progress had been made by others."

AN ELEGANT FLOWER.

A FOREIGN journal calls attention to the Myosotis Azorica, or the "Azorean Forget-me-Not," and we may be doing a good service to our amateur florists to call their attention to it. It deserves to be better known than it is.

It is very easily managed, forms a good-sized specimen, produces its flowers in great abundance, and retains them for a long time. Its color is a deep purplish blue. We consider it a very valuable acquisition, more especially for the decoration of the conservatory or greenhouse, and it would be very suitable for the sitting-room window of the amateur. The following hints may be useful to such as are commencing its cultivation:

It may be procured from most nurseries, and seed may be obtained readily. If it is to be raised from seed, it will require the ordinary treatment of greenhouse plants in that state. It enjoys a close moist frame. It will hardly be possible to grow it to such a size as to be worth notice as a flowering plant during the first season. When moderately strong, it may be potted off into four-inch pots, and when the plants have filled these with roots, shift into seven-inch pots. After they have become established, they may be removed to a situation near the glass in the greenhouse, where they may remain during the autumn and winter. They will now be strong bushy plants, forming a good foundation for the season's specimens, particularly if several plants have been put into one pot. After they have fairly commenced growth in spring, shift them into twelve-inch pots, and place them in the warmest corner of the greenhouse. They will soon make vigorous growth, and may be neatly trained to small stakes. With ordinary management and care, they will soon be some eighteen inches high and two feet through; and about the beginning or middle of July they will be covered with flowers, like our pretty Forget-me-Not, but much larger and much darker.

A mixture of loam and peat suits it perfectly, adding, of course, a portion of silver-sand, according to the nature of the soil; and the latter had better be used in as rough and fibrous a state as it can be had; but I imagine

amateurs begin to be aware that this is a point worth attention in the culture of pot-plants generally. The greenhouse or sitting-room window will suit it perfectly when in flower; and the plants after flowering may be cut back and taken care of for another season, or thrown away to make room for young ones. The latter will generally be found to make the best specimens.

PROPERTIES OF CHARCOAL.

Among the many properties of charcoal may be mentioned its power of destroying smell, taste and color; and, as a proof of its possessing the first quality, if it be rubbed over putrid meat, the smell will be destroyed. If a piece of charcoal be thrown into putrid water, the putrid taste or flavor will be destroyed, and the water be rendered comparatively fresh. Sailors are aware of this; for when water is bad at sea, they are in the habit of throwing pieces of burnt biscuits into it to purify it. Color is materially influenced by charcoal, and in numbers of instances in a very irregular way. If you take a dirty black syrup, and filter it through burnt charcoal, the color will be removed. The charcoal of animal matter appears to be the best for this purpose. You may learn the influence of charcoal in destroying colors by filtering a bottle of port wine through it: in the first filtration it will lose a great portion of its color, and become tawny; repeat the process two or three times, and you have destroyed it altogether.

AGRICULTURE IN CANADA.

The *Cultivator* for December, in an article on this subject, writes thus of ploughs and ploughing in that country:

The first thing that would attract the attention of the American farmer, in travelling through the Canadas, is the strange, cumbrous, and seemingly unique appearance of the ploughs, which consist of as great a variety of patterns as do the ploughs of our country. These ploughs embrace all of the most improved English and Scotch patterns, with an almost endless number of mongrels, built to gratify the tastes and whims of the mixed race of people who inhabit that country. No patent laws exclude them from general use, and nevertheless almost every county, and sometimes even township, has a plough in general use, embodying distinct features from those in adjoining counties and townships. A Canadian plough is fully twice as long as an American, and they are constructed to turn a furrow from nine to twelve inches in width, and from six to nine inches in depth. They are supposed to be much easier in the draught than the American plough, and owing to the great length of the handles, are very easy to hold. At many of the State and county ploughing matches of this State, ploughs of a very similar pattern have entered the ranks for competition with American ploughs, and in some cases have won the palm and in others have failed. Those who have witnessed these performances can fully appreciate the difference that exists between the ploughs of the two countries, and can determine for themselves in which consists the superiority.

Ploughing matches, conducted upon the most enlightened scale, are held every spring under the patronage of the county and township agricultural

societies, at which premiums ranging from $10 to $30 for the best specimens of work are awarded, including in the list some hundred or more dollars, divided into classes under junior and senior departments. These ploughing matches, embracing as they do some ten to fifteen in a populous county, and occurring as they have done for the past ten to twenty years, have become instrumental in perfecting a uniform practice in ploughing, and form one of the most marked features of the agriculture under notice.

THE INTEREST OF THE AMERICAN LABORER.

Many of the working-men of this country hold, as we think, very erroneous opinions in regard to the great question upon which so much of their prosperity depends—the encouragement and protection of Home Industry, as opposed to the free trade or revenue scale of duties, *ad valorem* or otherwise. We see that the question is likely to be brought before Congress and the country in its strongest light, by the adoption of absolute *free trade* and *direct taxation* for the support of the General Government. A resolution to that effect has passed the House, and the subject referred to a committee; and, from the great preponderance of free-trade members in Congress, and the present apparent strength of that party, there is a possibility that such a measure will be apopted, at least experimentally.

Such a measure will be ruinous to the interests of American producers much more extensively than has the low rate of duties under the tariff of 1846. The opening of our markets to foreign fabrics and productions in such a manner as to compete with and undersell our own labor, is one of the most serious errors into which our legislators fall. But as long as they are supported by the votes of the people themselves, they will naturally adopt the course which will commend them to the popular favor. We believe, however, that there are few really intelligent legislators who are not convinced that Protection is the true policy for our country; yet "Free Trade" has a popular charm about it which commends it to large masses of our people, who do not investigate the principles involved and the consequences growing out of such a commercial system.

We believe that national as well as individual economy should lead us to supply ourselves with whatever we can furnish to meet our wants, and buy such foreign productions only, as a general thing, which nature denies to us, or which she is persuaded with difficulty to yield. Take iron, for instance. Nature opposes no obstacle to our production of iron to an unlimited extent. There is no country where, in fact, it is more easily obtained, more favorably exposed, or where it occurs in richer mountain masses. Is it not simply preposterous and absurd that we should go three thousand miles to buy iron, when we kick it about at our feet, and it only requires a sure market to become of immense value? The advocates of foreign iron contend that if we can buy cheaper iron abroad than we can of our own producers, we should do so. But if foreign iron is cheaper, how comes it that we are now paying such an extravagant price, with the scale of prices constantly advancing? Iron has gone up, and other products and fabrics are running up in price at the same time; so that the purchasers of these articles are paying more than they would have done under protection to American labor.

It seems to be forgotten by producers and laborers generally, that merchandise is nothing but the LABOR of the agriculturist, the artisan, the

mechanic, the merchant, the clerk, and the stock-grower, in a tangible and commercial form. Shoes, clothes, iron, cutlery, nails, glass, hats, and books simply imply the LABOR of working-men which has been expended in their production. These articles are not of spontaneous growth. They are the products of the skill and toil of one laborer after another; and each additional value conferred upon the article is the value of the labor bestowed upon it. Ore is dug from the bed or the mine, and from that moment until it becomes the beautiful and delicate watch-spring, it has been undergoing change after change, until its value has been increased a thousand-fold.

Now, American laborers do not, cannot, and will not work for the same rate of wages as foreign laborers—that is, they will not sell their LABOR for the same price as the German, French, or British worker. The difference in cost between American and foreign articles is mainly the difference in the price of LABOR; for these articles only represent the labor of the worker spent in making them ready for market.

The importation of foreign merchandise into our country is therefore affording a market for FOREIGN LABOR in our market, which foreign labor being *cheaper*, can consequently afford to *undersell* us in our own market. In other words, if we purchase the labor of foreign workers, in the shape of merchandise, to the amount of two hundred millions of dollars, we deprive our own countrymen of a market for their LABOR to the amount of two hundred and fifty millions of dollars; we thereby benefit the labor market and enhance the value of LABOR in Europe to that amount, and depreciate our own. Can this conclusion be avoided?

For convenience of illustration, we will say that a pair of boots, or a hat, represents a day's work of a working-man; a cloth coat represents ten days' work; a ton of iron represents twenty-five days' work; and so of cutlery, glass ware, calico, carpets, oil-cloth, jewelry, or anything else. From the moment when the spade first strikes the ground until the ore or the product has passed through all its various manipulations, and comes out a finished article, the process has been that of adding the labor of one man to the labor of another who has preceded him. A pair of boots represents the labor of the bootmaker, the tanner and currier, the drover, the stock-grower, and the farmer who produced the grain upon which the animals were fed. Thus the process has been one of adding labor and skill to that which has preceded, until the finished fabric is ready for market. Now, as one thousand tons of iron may represent twenty-five thousand *days' works* of working-men, and a thousand yards of cloth will represent three or four thousand *days' works* of the laborer, it is clear that the same holds good of all other fabrics and products whatsoever. Hence, it is just as clear that when a thousand tons of iron are imported, or yards of cloth, or pairs of boots, or suits of clothes, or dozens of cutlery, or packages of screws, just so many thousand days' works of foreign laborers are imported to enter into competition with and undersell in our own market the same number of *days' works* of American workers.

Now, the only *alleged* reason why men advocate "free trade," by which is meant a low rate of duty sufficient for revenue, is this: We can buy these articles cheaper in Europe. Now, cheap products simply mean *cheap days' works of the working-men who produce them.* One man may build a house for ten thousand dollars, and another a similar one for eight. What is the cause of the difference? *Cheap days' works of the laborer!* So of every thing else. Hence, the plain, unvarnished English of the free trader is this: *He is in favor of importing the cheap days' works of foreign laborers, and letting his own*

countrymen go a-begging for work unless they will sell their days' works just as cheap.

It seems to us that this view of the question is one from which working-men cannot escape. As a consequence of the free-trade system, there is nothing strange in two or three or more years' stagnation in many branches of industry, when the foreigner can undersell us, with an insecurity and fluctuation of prices and demand which discourage the American from entering into fair competition with the foreign producer.

We commend these brief thoughts to our readers generally, as mere hints towards a view of the question of Protection and Free Trade which is of the highest importance to their interest.

COAL DUST FOR MANURE.

Our recent numbers have often contained statements in reference to the power of charcoal in various ways to administer to our need. We have also copied a paragraph which commended the use of anthracite coal ash for manure. The following statement is found in an exchange without the name of the paper. We are inclined to think it is the *Germantown Telegraph.* The writer says:

I have never seen any notice of coal dust, as a manure, but the finest and most luxuriant stalks of the poke weed (used and preferred here for early greens, because it is more tender and succulent) are found growing among the heads of dirt around the mouths of the coal mines. Its growth is most rapid, and it blanches beautifully in such situations. Upon the heaps of coal dust upon the wharves of Philadelphia, fine crops of oats may be seen growing, with extraordinary vigor, without any soil. I am not a farmer, but I can answer for its efficacy on a garden made in this region; and from the fact of fruit trees, which suffered from insects in the roots for several seasons past, being very healthy this year, after removing the soil, and covering the roots with coal dust.

No one who has not witnessed the powerful effects of pulverized charcoal on culmiferous and leguminous plants, can easily be induced to believe the extent to which the favorable action of the article is developed by the surprising and almost immediate expansion of the vegetables to which it is applied.

The anthelmitic properties of the dust are also a very powerful argument in its favor, as well as the absorbent properties characterizing it. The gaseous products of fermentation, and the aura resulting from the economy and development of vegetable life, and which not only cumbers the air in vast quantities, but acts under favorable circumstances as a most salutary, and, indeed, indispensable agent of vegetation, is attracted, absorbed and economized by this substance in surprising quantities. As a dressing for onion beds, it is perhaps unrivalled in the whole catalogue of manures. In Scotland, a piece of land was shown, not long since, on which this vegetable had been grow for upwards of seventy years consecutively, and with no other material or stimulating agent long applied! The productiveness of the soil, and the quality of the crop, steadily improved. On the wheat lands of Pennsylvania, it is extensively used. It is also applied to the corn crop, and in both cases with like success. A dressing of coal dust will last ten or

fifteen years—charcoal being nearly indestructible in its value, when thus used, as is evinced by the fact that parts of limbs charred by burning off the primitive growth in clearings, are often found many years after perfectly sound and undecayed, though buried beneath the soil.

Patents for Improvements Issued for December, 1852.

Robert Bunker, Rochester, N. Y., in machinery for bending pales, &c. Lewis W. Colver, Louisville, Ky., for seed-planters. Richard S. Crammer and Cyrus Blossom, Somerville, O., in saw-gummers. Charles W. Coe, Ashtabula, O., drilling-machines. Francis Degen, New-York, N. Y., in hats. Phineas Emmons, New-York, N. Y., for tonguing and grooving apparatus. Stephen Gates, Albion, N. Y., for hot-air furnaces. Ed. L. Gaylord, Newark, N. J., machinery for bending carpet-bag frames. C. P. Brown, Griggsville, Ill, for grain and grass harvesters. Louis Drescher, New-York, N. Y., galvanic battery. George Grant, of Troy, N. Y, hinge for moulders' flasks. John T. Hammitt, of Philadelphia, Pa., an improved chair. Lansing E. Hopkins, New-York, N. Y., machine for hat bodies. Richard Ketchum, Seneca Castle, N. Y., improved lock. Rodolphus Kinsley, Springfield, Mass., for a padlock. John Levy and Charles Jones, New-York, N. Y, frosting glass. John McCreary, Chesterville, O., wooden type. Erasmus A. Pond, Rutland, Vt., pill-machine. William Stoddard, Lowell, Mass., for shingle-machines. Jacob W. Switzer, Basil, O., for screw-driver. Warren W. and Clark C. Wright, Canton, Pa., for reels for harvesters. William H. Smith, Philadelphia, Pa., for utilizing slags of furnaces. Cullen Whipple, Providence, R. I., assignor to the New-England Screw Company of same place, improved machinery for making wood-screws, &c. William P. Blake, New-York, N. Y., a lining for iron safes, &c. James C. Forrest and George Baker, Schenectady, N. Y., for trip-hammers. Joseph H. Gest, Batavia, O., field-rollers for cutting stalks and weeds. Robert Hinton, Roxbury, Mass., manufacture of ball castors. Joseph U. Houston, Conway, Mass., for stone picks. Clark Polley, May's Landing, N. J., buckets for endless chain pumps. Zimri Hussey, Chillicothe, O., apparatus for treatment of fractures. Henry Nyncum, Uniontown, Pa, seed-planters. Abram, Charles, and Charles N. Clow, Port Byron, N. Y., for scythe-snaths. Joel Dawson, of Barnesville, O., for straw-cutters. William Field, Providence, R. I., machinery for forging metals, &c., dated Dec. 14, 1852; ante-dated June 14, 1852. Zimri Hussey, Chillicothe. O., apparatus for the cure of club feet. Harvey Sprague, of Riga, N. Y., for plough regulators. Philip P. Trayser, Baltimore, Md., for spike-machines. Moses D. Wells, Morgantown, Va., for seed-planters. William H. Seymour, Brockport, N. Y., assignor to W. H. Seymour and Daton S. Morgan, of same place, for grain and grass harvesters, dated Dec. 14, 1852; ante-dated Oct. 25. 1852. Cullen Whipple, Providence, R. I., assignor to the New-England Screw Company of same place, for mechanism for pointing and threading screw-blanks in same machine, ante-dated Oct. 16, 1852. Lydorian Ricketson, administratrix of Henry H. Ricketson, deceased, of New-Bedford, Mass., for machines for cutting whale-blubber. Jearum Atkins, of Chelsea, Ill., for rakes to harvesters. W. S. Carr, New-York, N. Y., for water-closets. A. S. Dozer, Norfolk, Va., for ventilators. Warren Gale, Louisville, Ky., for straw-cutters. W. A. Gates, Mount Comfort, Tenn., for ploughs. Lansing E. Hopkins, New-York, N. Y., machinery for manufacturing hat-bodies. John Jones and Alexander Lyle, of Rochester, N. Y., for grain-threshers and cleaners. W. H. Morrison, of Indianapolis, Ind., for equalizing apparatus for engines which use steam expansively. Jacob L. Ream, Mount Pulaski, Ill., for maize harvesters. S. W. Rogers, Baltimore, Md., for cut-off valve motion. Jesse N. Seeley, Forsyth, Ga., for potato-diggers. Thomas Snook and Stephen Hill, Rochester, N. Y., for lamps to locomotive engines. John Swindells, Manchester, Eng., manufacture of chromate of soda. William E. Underwood, Middlefield, Mass., for improved fulling-mills. Daniel Walroth, Chittenango, N. Y., and Lucius Evans, of Manlius, N. Y, machinery for separating iron from furnace-cinders. Caleb C. Walworth, improved steam flat-irons. Aretus A. Wilder, Detroit, Mich, for planing-machines. W. H. Woodworth, of Salmon Falls, N. H. for method of measuring cloth on the beam. Linus Yale, Jr., Newport, N. Y., for safety-lock.

List of Designs Issued during December.

Ezra Ripley and N. S. Vedder, of Troy, N. Y., assignors to Samuel McClure, of Rochester, N. Y., fo design for a cook-stove. Joseph Wager, Volney Richmond, and Harvey Smith, of Troy, N. Y., for a box stove. Nicholas T. Horton, Cincinnati, O., for iron railing. Gilbert Knapp and Adnah H. Neal, of Honesdale, Pa., for a coal-stove. Sherman S. Jewitt and Francis H. Root, of Buffalo, N. Y., for stove-plates. Sherman S. Jewitt and Francis H. Root, of same place, for a cooking-stove. James Wager, Volney Richmond, and Harvey Smith, of Troy, for a hearth-plate. Washington L. Pearsall and Sylvester W. Pearsall, New-York, N. Y., for a spittoon.

NEW BOOKS.

Footsteps of our Forefathers: what they suffered and what they sought; describing Localities and portraying Personages and Events, conspicuous in the Struggles for Religious Liberty. By JAMES G. MIALL. Boston: Gould & Lincoln, 1852. 352 pages.

The title of this work is a fit description of its contents. The style is good, and the incidents are often intensely interesting. The scenes described occurred chiefly in the period commencing with the accession of Henry VIII. and closing with the reign of James. The frequent and abominable assumptions of ecclesiastical power by the different sovereigns then upon the throne, and the individual persecutions of Wiclif, Hampden, Pym, Baxter, Wm. Penn, Geo. Fox, and others, are minutely set forth, and perhaps justify the declaration of the author, that "ecclesiastical authority is not safe in the hands of civil rulers." The volume is illustrated by 36 engravings.

The Memory of Washington: with Biographical Sketches of his Mother and Wife, &c. Boston: James Monroe and Co. 1852. 320 pages, 12mo.

This is a book of incidents and anecdotes illustrating the life of Washington, rather than a history. It cannot fail to be popular.

Home Cookery: a Collection of tried Receipts, both foreign and domestic. By Mrs. J. CHADWICK. Boston: Crosby, Nichols & Co. New-York: Chas. S. Francis & Co. 1853. 159 pages.

This volume, like good bread, is much *kneaded*, for the number of good cooks is wonderfully small; and though we have no peculiar illumination on this subject, we can honestly say, after a careful examination of it, that we should be better satisfied with reading some of these receipts, than by eating of the culinary products of many a household in this "happy land." We are always glad to see good cookery books, for half the unhappiness in the world is the consequence of bad bread and bad cooking.

The Metropolitan Glee Book, or Alpine Glee Singer. Vol. II. By WILLIAM B. BRADBURY. New-York: Newman & Ivison. 1852.

This is one of the best Glee Books we have ever examined. The selections are good, the arrangements good, the typography clear, and the whole quite to our taste. It contains "Glee Choruses, Opera Choruses, and Four-part Songs from the most popular authors." To this variety are added, for some good reason, we suppose, several of the magnificent choruses from the Messiah.

Outlines of a System of Mechanical Philosophy; being a Research into the Laws of Force. By SAMUEL ELLIOTT COUES. Boston: Chas. S. Little & James Brown. 1851. 330 pages, large 12mo.

We promised for this a careful reading, and have so far kept the faith. But we have not yet reached the middle of the work. Thus far we find some things worthy of serious attention, but some things hard to be understood. We doubt whether Mr. Coues will be regarded a successful competitor with Sir Isaac Newton, but it does not follow that all of his criticisms are essentially erroneous. The received theory of capillary attraction, for example, always seemed to us a perfect humbug. So also do we regard some of the explanations of some forms of "reaction," so called. But we are not sure that anybody can give us better ones. We are quite in the dark on many of the points over which Mr. Coues has poured his light, and we never expect to be much wiser on these matters than we now are. Least of all do we expect to see the system of "gravitation" broken up, or any theory of "attraction" more attractive than that now received by the scientific world.

A Selection of English Synonymes. First American, from second London edition. Boston: Jas. Monroe & Co. 1852. 179 pages, 12mo.

A book well adapted for general study in all our schools and seminaries, not only *exact* but *accurate* in its distinctions, and exhibiting *talents, capacity* and *ability* in the author.

It is neither too *costly* nor too *expensive* for any and every man who would understand our language. In short, this is a book we earnestly commend to the favorable regard of every teacher, and to the careful study of every scholar.

Rural Chemistry: an Elementary Introduction to the Study of Science in its relation to Agriculture and the Arts of Life. By EDWARD SOLLY, F.R.S., &c. First American, from the third English edition. Philadelphia: Henry Carey Baird. 1852. 391 pages.

This is an excellent work. It first appeared in the columns of *The Gardener's Chronicle,* which is, no doubt, the ablest agricultnral journal in the world. It is clear and comprehensive, and meets the urgent wants of the agricultural community.

A Class Book of Chemistry, &c. By EDWARD L. YOUMANS, author of "A New Chart of Chemistry." D. Appleton & Co. 1852. 340 pages.

This is a well-executed 12mo, explaining the principles of Chemistry in its application "to the Arts, Agriculture, Physiology, Dietetics, Ventilation, and the most important phenomena of nature, for the use of academies and schools." From a hasty perusal, we are led to think very favorably of the work. It seems more attractive than most elementary books on this subject. We notice by the way, that in speaking of the Koh-i-noor diamond, the author quotes its estimated value as "$10,000,000, equal to about seventeen tons of gold."

Templeton's Engineer's, Millwright's and Mechanic's Pocket Companion, &c. By JULIUS W. ADAMS, Engineer. D. Appleton & Co. 1852. 236 pages, 18mo.

This useful manual comprises Decimal Arithmetic, Tables of Square and Cube Roots Geometry, Mensurations, Strength of Materials, Mechanic Powers, Water Wheels, Pumps' Engines, &c., with a series of Tables, relating to circumferences, diameters, areas, squares cubes, and kindred topics. The work is executed in good style, and is a very convenient, and almost indispensable "pocket companion" for various artists and mechanics.

Le Bijou Musical, choix, de Solos et Trios, des Operas Modernes les plus populaires, et d'autres Ouvrages de Verdis, de Mercadente, de Donizetti, de Rossini, de Bellini, de Blangini, et d'autres Maitres, en Ilatien, en Français, et en Espagnol, &c., &c. Par ANTOINE LAURENT DE RIBAS. 2d Edition. Boston: Joseph Quimby. Sold by E. H. Wade, 197 Washington street, Boston.

This volume contains 132 pages of choice selections from the greatest Italian masters, well arranged, as solos, duets, &c., with accompaniments for piano-forte or guitar. It is a handsome volume externally, well printed and bound, and is a necessary part of every musical library.

The Doll and her Friends, or Memoirs of the Lady Seraphina. By the author of Letters from Madras, Historical Charades, &c. Boston: Ticknor, Reed & Fields. 1852. 120 pages.

This is quite a story. Lady Seraphina falls into the hands of several persons, who differ very essentially in their manners and disposition, and she, poor Doll, is always the victim. Buy it by all means.

Aunt Effie's Rhymes for Little Children. With 24 illustrations, by Hablet K. Browne. Boston: Ticknor, Reed & Fields. 1852.

One of the handsomest and best gift-books for children of the season. In the meeting of the tools in the carpenter's shop, the Plane was contented, according to his own story, when he was fed on shavings "not too coarse in the grain." We think children would thrive well on such books as this.

NEW MUSIC.

MESSRS. HALL & SON, Broadway, have commenced the publication of a series of selections from the Operas. Heretofore the want of adaptation of these beautiful Arias, Duets, &c., for parlor music, has been such, that they have been heard only at concerts and the opera house, while among these are many of the finest compositions in existence. We are glad, therefore, that those enterprising gentlemen have taken hold of this matter.

Three selections are on our table, from *La Favorita*, "Spirito Gentil," "Una Virgine, and "Fia Vero," the first two being arias, and the third a duet for soprano and tenor, all excellent music, and each well adapted for the object in view. The series is edited by WM. HENRY WATSON. The words are given in English, Italian and French.

MESSRS. HALL & SON have also laid on our table *Alary's celebrated Polka Aria*, sung by Madame Sontag, arranged with variations for the pianoforte, by W. VINCENT WALLACE. A splendid aria; and Wallace's name is a sure guaranty that the arrangement and variations are in the most admirable manner.

Afton Polka. By J. A. FLOWER; composed for the Pianoforte, and inscribed to his young friend, Miss Maria Atoinette Wait. A simple and pretty composition.

The Zephyr Schottisch. For the Pianoforte. By J. F. STONE. Decidedly pretty, and readily understood.

The Marriage Bells Polka. Composed and arranged for the Pianoforte by O. GREGORIO. Also a brilliant and effective piece, sure to be popular.

MR. WADE, of Boston, has published the following:

Fleurs de Salon, from Les Quatre Fils Agmon, &c.

These pretty and simple selections were composed expressly for "little hands;" and the end sought is very successfully accomplished.

Pot Pourri, from La Sonnambula. Arranged by CARL CZERNY.

An easy and simple arrangement of all the favorite airs of this well-known opera.

Mozart's Sonatas, No. 11.

Mr. Wade has done the public a very great favor in giving them this splendid series Mozart's *Sonatas* have no rival, and this arrangement of them does great credit both to editor and publisher.

EDITORS' JOTTINGS, ETC.

TELEGRAPH IN AMERICA.—The Superintendent of the Census has printed a Report on the telegraphs of the United States, based on returns furnished in reply to special circulars. Through this Report we realize that man, by telegraphic agency, is speedily extending his control over nature. The telegraphic network is spreading through every village, and binding in intimate relations every city. It is achieving the solution of the problem of an empire of States, for it is interlinking them together. Its office in the future will be the promotion of "peace on earth, good-will to men."

We find from the Report that in 1844 an appropriation was made by Congress to test the practical operation of Morse's invention. The line ran from Washington to Baltimore; thence to Philadelphia and New-York, reaching Boston in the following year. Two branches diverge from this line —one from Philadelphia to St. Louis, 1,000 miles long; the other from New-York, *viâ* Buffalo, to Milwaukie, 1300 miles long. One also 1395 miles in length, goes from Buffalo to Lockport, and from thence through Canada to Halifax, N. S. The great southern line from Washington to New-Orleans is 1700 miles long. Another is 1200 miles, running to New-Orleans from Cleveland, Ohio, *viâ* Cincinnati. The best paying line is that from Washington to New-York, which, during the first six months of the present year, transmitted 154,514 messages, valued at $68,499. The receipts on this line from July 1, 1851, to July 1, 1852, were $103,860. The average performance of the Morse instrument is to transmit from 8,000 to 9,000 letters per hour. The cost of construction, including wire, posts, labor, &c., is about $150 per mile. The Bain telegraphs in this country are 2,012 miles. They are limited to New-York State and New-England. House's printing telegraph has about 2,400 miles in operation, extending south to Washington, north to Boston, west to Buffalo, and promises a large south-westerly extension. Total of main and branch lines, 89; length, 16,729 miles. Yet the Electric Telegraph is but in its infancy!

PHILADELPHIA, WILMINGTON, AND BALTIMORE R. R.—Recently the newspaper press has complained very bitterly of the delay of the United States Mail between New-York and Washington. We have seen no allusion to any road in particular as the cause of the delay, but, lest the above road might come in for a share of the blame, we beg leave to say that it is not justly entitled to any. It is true that a vexatious and

needless detention *does occur* at the Susquehanna River, but it is also true that the cause of the difficulty does not rest with the Company. Nothing but a bridge at that point can ever relieve the public of this delay; and a good and substantial bridge will be built just as soon as the Legislature of Maryland grant the Company the right to construct it. This right, it was hoped, would have been given at the last meeting of the Legislature; and SAMUEL M. FELTON, Esq., the able and enterprising President of the Road, exerted himself up to the very last hour of the session to secure that result, but in vain!

The road is under the best of management, and is keeping pace with the wants of the public and the spirit of the age. Its efficient President is keenly alive to every thing that will promote its prosperity or benefit the travelling community. Only let the Company be relieved from the restraints under which they are placed by the statutory prohibitions of Maryland, and the Philadelphia, Wilmington, and Baltimore R. R. would soon compare favorably with any road in the United States, both as regards speed and whatever else is desirable in railroad travelling.

CALCULATING MACHINE.—When Babbage first propounded his calculating machine, it was considered a good jest, a vagary from the brain of science; but a city contemporary, who has been to look at Fuller's calculating machine, proves that genius has elaborated an invention that computes interest at every possible rate per cent., upon any sum of money, for any length of time. This machine has a most perfect time telegraph to compute the number of days any note has to run. It works equations of payments, or average of accounts. Less time is required to obtain an answer to any business question than to prepare the statement. This machine occupied a prominent place in the Crystal Palace. Copies of it have been purchased in Washington by all the departments, and it is used by many of our principal bankers and merchants. Its *modus operandi* can be learned in an hour.

The following responses were rapidly recorded to questions prepared, at a trial of its powers a few days ago: The Rotunda of the Capitol, being 90 feet in diameter, would contain 2,830 persons, and allow 2¼ square feet, or 18 by 18 inches. The Crystal Palace, being 1,941 feet long and 400 wide, with an additional acre to the transept or centre, measures 18 acres, and would contain at the same rate 347,000 persons on the ground. The population of the globe, being estimated at 900,000,000 could stand upon 40 square miles, or an area of 6 33-100 miles square.

If 900,000,000 of persons pass away every 30 years, and the world should be 6,000 years old, this would be equal to 200 times 900,000,000. Thus the entire number of persons would have standing room on 200 times 40 square miles, or 8,000 square miles of land, or a trifle less than 90 miles square.

If 900,000,000 die every 13 years, in one year 30,000,000 die. If 30,000,000 die in 365 days, in one day 82,000 die. If in 24 hours 82,000 die, how many per hour?—Ans. 3,420. If in 60 minutes 3,420 die, how many per minute?—Ans. 57.

The expense of the United States House of Representatives, at $8 per day, amounts to $1,944. The salary of the President is $68½ per day. The pension of the late Queen Adelaide was £100,000 per annum, equal to $1,325 per day.

The revenue of the United States for 1851, at $52,000,000, is equal to $1.65 per second.

NEW METHOD OF ROOFING.—A Mr. Cowper, of England, has patented some improvements in coverings for buildings, worthy of our notice here. The London *Mining Journal* says that the method is by means of tiles of sheet-iron, rendered applicable for the purpose by coating it with an enamel or composition capable of protecting the metal from the weather. Tiles, according to this manufacture, may be of any suitable form, with a view to render them more or less ornamental, combined with utility. The body of the tile, which is of thin sheet-iron, is cut or stamped of the proper shape. It also has a raised head formed round the edge, to prevent the water from running off the tile, with the exception of the lower end, where it drops on to the next. Two holes are also punched for fixing the tiles on the wood-work. The upper or narrow end of the tile is bent at right angles, which is introduced in an opening between supporting laths or strips of wood. The hooks or right angled portion sustains the tile, while two nails, introduced at the holes, steady and keep it in its place. In lieu of the nails before referred to, to fix the tiles, the patentee sometimes rivets a hook so as to project on the under side of the tile; the stem of the hook is riveted through a hole in the metal plate before it is enamelled, which, when so coated, is impervious to water, and obviates the necessity of an India-rubber washer under the head of the nail, which is required when fastened by nails through the holes. The coating of these tiles is applied in two separate compounds, the one as the body, and the other as a glue for the surface of the composition. The coating for the body

consists of sand or silica; the glue, or second coating, is applied in the shape of fine powder, which is dusted on the wet coating until the entire surface is covered. The powder adhering to the moist coating causes it to set in some measure, when the tile is deposited in a drying-room, previous to baking or firing. The tiles may be rendered ornamental by the application of coloring matters, according to any design or pattern, which are burnt in, and thereby rendered indelible, as well understood in porcelain manufactures.

"The Curfew Tolls the Knell of Parting Day." — Perhaps nothing more strikingly illustrated the truth that poetry is the universal language which the heart holds with nature and itself, than the fact that Daniel Webster's mind in his dying moments reverted to it. Here was a man whose intellectual power extended over millions; with whose heart millions beat in sympathy; a chief who could raise and calm the mental tempest; whose words could agitate thrones and still the waves of mutiny; himself yielding up his breath to these appropriate stanzas:

The curfew tolls the knell of parting day,
The lowing herd winds slowly o'er the lea,
The ploughman homeward plods his weary way,
And leaves the world to darkness and to me.

Now fades the glimmering landscape on the sight,
And all the air a solemn stillness holds,
Save where the beetle wheels his droning flight,
And drowsy tinklings lull the distant folds.

* * * * * *

Beneath those rugged elms, that ewe tree's shade,
Where heaves the turf in many a mouldering heap,
Each in his narrow cell for ever laid,
The rude forefathers of the hamlet sleep.

* * * * * *

The boast of heraldry, the pomp of power,
And all that beauty, all that wealth e'er gave,
Await alike the inevitable hour;
The paths of glory lead but to the grave.

The fact that Mr. Webster's masculine mind was captivated with poetry is proof that it is no mere trifling amusement of a few idle readers or leisure hours; but is in reality the ideality of human character and human destiny. Poetry gives, or is, a sense of beauty, or power, or harmony, as in the motion of a wave of the sea, in the growth of a flower, in wonder, pity and hope. Mr. Webster relieved the prose of his every-day routine by the poetry of his country home, "his lowing herds, his rugged elms," and the "paths which lead but to the grave."

Benefit of Railroads.—The Boston *Courier* says: "Sixteen cars loaded with eight sticks of timber, for ships' masts, 84 feet in length and 3 in diameter, loaded in Buffalo, were yesterday brought over the Buffalo and Rochester Railroad, Rochester and Syracuse, Syracuse and Utica, Utica and Schenectady, Rensselaer and Saratoga, Saratoga and Washington, Rutland and Washington, Rutland and Burlington, Cheshire, Fitchburg, Grand Junction, to East Boston, and thence over the Eastern Railroad to Portsmouth, N. H., 628 miles, without change of cars. Four car loads of slates were also brought at the same time over the Rutland, Cheshire, and Fitchburg Railroads, to the Grand Junction depot at East Boston, from the slate quarry recently opened in Fairhavep, Vt.

Electrical Discovery.—An important practical discovery in voltaic electricity has lately been made by a correspondent of the *Courier and Enquirer*, which promises to be of great use to weak persons of both sexes, and to the cure of nervous diseases. It is as follows:—"If a cylindrical piece of zinc is placed near the top of a broom-handle and another about fifteen inches below, connection being made between the two by means of a wire, a person taking hold of the top piece with the right hand, while the left is placed on the copper or lower piece, forms a voltaic circle, which becomes powerful the more the broom is used. The hands must be without gloves, so that the metals are in contact, and the windows of the room should be open when the broom is used, so as to admit the air freely. The discovery is invaluable to females in a weak state for want of active life, and for males it can be applied to axe handles."

Nantucket.—"Take out your map and look at it. See what a real corner of the world it occupies: how it stands there, away off shore, more lonely than the Eddystone lighthouse. Look at it—a mere hillock, and elbow of sand; all beach, no background. There is more sand there than you would use in twenty years as a substitute for blotting paper. Some gamesome wights will tell you that they have to plant weeds there, they don't grow naturally; that they import Canada thistles; that they have to send beyond seas for a spile to stop a leak in an oil cask; that pieces of wood in Nantucket are carried about like bits of the true cross in Rome; that people plant toadstools before their houses, to get under the shade in summer time; that one blade of grass makes an oasis, three blades in a day's walk a prairie; that they wear quicksand shoes, something like Laplander snow shoes; that they are so shut up, belted about, every way inclosed, surrounded, and made an utter island of by the ocean, that to their very chairs

and tables small clams will sometimes be found adhering, as to the backs of sea turtles."

So says an exchange, and the statements are true, though some of them must be taken "in a Pickwickian sense." But visit that desolate sand-bank, and you will find one of the most friendly, hospitable, benevolent people that ever lived on the face of the earth. They are also remarkably intelligent, not so much given to book knowledge, but full of sound sense, apt to observe, and making the most of the advantages they enjoy. Females remain at home, but our own sex are sailors almost from the cradle.

Plastering Machine.—Mr. Isaac Hussey, of Harveysburg, Ohio, has taken measures to secure a patent for a machine to supersede manual labor in plastering walls. It consists of a movable frame upon rollers that can be adjusted to suit any height, and of a smaller frame sliding within it. The small frame supports a mortar box with trowel, which is raised and lowered by means of a drum and endless chain. The trowel when in operation is supplied with mortar by a rod and follower, which are worked by a lever, the quantity being regulated or shut off as required by a slide that covers the opening in the box. Through various cords and pulleys attached to this machine, it can plaster ceilings or walls with equal facility.

Manufacture of Writing Quills.—These consist usually of feathers plucked out of the wings of geese. Dutch quills have been highly esteemed, as the Dutch were the first to hit upon the art of preparing them well, by cleaning them both outside and inside from fatty humor with which they are naturally impregnated, and which prevents the ink from flowing freely along the pen. The Dutch for a long time employed hot cinders or ashes to attain this end; and their secret was preserved very carefully, but it at length transpired, and the process was then improved. A bath of very fine sand must be kept constantly at suitable temperature, which is about one hundred and four degrees Fahrenheit; into this the quill end of the feather must be plunged and left in for a few minutes. On taking them out, they must be strongly rubbed with a piece of flannel, after which they are found to be white and transparent. Both carbonate of potash in solution and diluted sulphuric acid have been tried to effect the same end, without success. The yellow tint, which gives them the air of age, is produced by dipping them for a little while in diluted muriatic acid, and then making them perfectly dry. But this process must be preceded by sand-bath operation. The above is the French process. The quills plucked from well-fed living birds have the most elasticity, and are less subject to be moth-eaten.

The best are those plucked, or which are spontaneously cast in the month of May or June, because they are then fully ripe. In the goose's wing, the five exterior feathers only are valuable for writing. The first is the hardest and roundest of all, but the shortest. The next two are the best of the five. They are sorted into those of the right and the left, which are differently bent. The heaviest quills are, generally speaking, the best. Lately steaming for four hours has been proposed as a good preparation.

Statistics of Michigan.—The statistics of Michigan, taken by direction of the Legislature, for the year 1849, give the following results of the flour mills: Number of mills, 288; run of stone, 568; barrels of flour made, 719,478; number of hands employed, 598; capital invested, $1,496,400. A comparative table of certain statistical returns made for the State in 1840, compared with similar returns of assessors made in 1849, shows the following result:

	1840.	1849.
Wheat raised.........bush.	2,157,108	4,739,300
All other grains...........	4,666,720	8,179,767
Wool....................lbs.	153,375	1,645,756
Maple Sugar made..........	1,329,784	1,774,269
Horses.................No.	30,444	52,305
Neat cattle..................	185,190	210,268
Swine.......................	295,890	152,341
Sheep	99,618	610,563
Saw mills...................	491	730
Flouring and grist mills....	190	228
Barrels of flour made......	292,860	719,478
Men employed in saw and flouring mills............	1,114	2,557

Rotary Engine.—If the inventors of the present day have not come up to Mr. Ewbank's apex of invention, namely, to discover new motors, at all events there is no lack of new modes of applying those we have. We notice that William Taylor, of Schenectady, N. Y., is securing a patent for an improved rotary engine, according to the following arrangement: A shaft is centrally placed in a fixed cylinder, while round the hub of the shaft are placed the pistons, which are pressed against the inner periphery of a circular collar attached to the cylinder. The *Scientific American* says that through this collar are cut the steam ports or openings, which are as wide as the space between the sides of the pistons. When, therefore, the steam issues through these ports, it impels the pistons, which revolve

within the collar, and carry the shaft round in their rotation. The mode of applying the steam is likewise peculiar. Between the outer surface of the collar and the inner surface of the cylinder, is a space which the inventor terms a steam-chest, having a stop placed in it to compel the steam to take the right direction. At each end of the cylinder is a head, which bears steam-tight against the sides of the hub and pistons; over this is another head, which serves to keep the cylinder ends also steam-tight. An excellent plan of packing the pistons, where they touch the collar, which is done by adjustible wedges. is one of the inventor's claims.

New Tinning Process.—M. Mare, of Nantes, France, has patented a new process of tinning iron articles. The process is as follows: The articles are scoured with sulphuric acid, and when quite clean are placed in warm water, then dipped in a solution of muriatic acid, copper and zinc, and finally plunged into a tin bath in which has been placed a small quantity of zinc. When the tinning is completed, the articles are taken and dipped into boiling water, and lastly are placed in a warm sand-bath, which last process softens the iron.

Chemical Discovery.—At a late session of the Royal Agricultural Society of England, a paper was read by a Mr. H. Reece, descriptive of a plan for purifying the air of stables, by a mixture of gypsum and saw-dust with sulphuric acid. It had been long noticed that horses and grooms were subject to inflammatory diseases, which were ascribed to the air of unventilated stables being impregnated with ammonia, a powerful stimulant which predisposes to lung diseases. Mr. Reece has made some extensive experiments in large stables, which proved quite satisfactory. It is said that the stables were, in the first instance, strewn with gypsum (crystallized sulphate of lime) coarsely powdered; but though the ammonia was evolved with the wetted straw, no trace of it was visible after two days' exposure, when examined with slacked lime. The stables were then strewn with the gypsum, moistened with sulphuric acid, and when examined next morning, every portion was found to have absorbed sufficient ammonia to emit its peculiar pungent odor when brought in contact with slacked lime. The stables had lost their close unhealthy smell, and, to use the words of the grooms, appeared to be quite sweetened. As it was evident the gypsum acted merely mechanically, affording a convenient absorbent surface for the acid, some further experiments were made, substituting saw-dust for gypsum, which were attended by still more favorable results. The prepared mixture should be laid upon trays, as the acid is considered likely to injure the horses' feet. One part of saw-dust will readily absorb three times its weight of acid solution, which should be mixed in the proportion, by measure, of one part of sulphuric acid to fifteen of distilled water. The ammoniacal salt makes an excellent manure, but it should not be mixed with the straw until after the removal from the stable.

Safety Steam Boiler.—There never has been a period in the history of the steam-engine, when a greater degree of anxiety existed to prevent the catastrophes attendant upon its use, than at present. The best minds of Europe and America are deeply reflective on the subject. One of the latest results of investigation in this path, is that of Henry Waterman, of Williamsburg, L. I., who has taken measures to secure a patent for an improved steam boiler, which shall be free from dangerous steam pressure, without diminishing its utility otherwise. The improvement consists in placing on the top of the boiler a cylindrical vessel termed a safety chamber. This vessel is prevented communicating with the steam in the boiler, by a metal plate sufficiently strong to bear the pressure of the steam up to any required maximum. Should the steam exceed that pressure, it would make the plate to rend, when the steam would rush into the safety chamber, and of course reduce the pressure. The capacity of the chamber decides the amount of reduction of pressure. To prevent the water foaming up to the safety chamber as the steam rushes in, another plate of the strength of the boiler is connected with the other safety plate, therefore the only way by which the steam can pass from the boiler to the under side of the latter being through a small pipe provided with a faucet. When the steam has rent the safety plate and rushed into the chamber, it sounds a whistle to inform the engineer of the occurrence. The pressure being by this time reduced, he closes the communication between the boiler and the chamber, allows the steam to escape from the latter, and as he is always provided with spare plates, he replaces the torn safety plate.

Air-Heating Pipes.—Jesse Young, Franklin Furnace, Ohio, is endeavoring to secure a patent for an apparatus for heating air for blast furnaces. The improvement is said to consist in the use of circular pipes, which communicate with and are supported on each other by means of hollow pedestals, (one pedestal to each pipe,) which are placed alternately at opposite ends, so that the air

passes all round the pipe before it arrives at the pedestal. The air is admitted by an opening in a rectangular-shaped air-chest, which likewise serves as a base, supporting it altogether on similar hollow pedestals. The apparatus is fixed horizontally, and to prevent the pipes from breaking through exposure to the intense heat, the inventor uses for supporters hollow pedestals, which, having a current of cold air circulating inside, counteract the effects of the heat.

Don't Kill the Small Birds.—The little painted songsters follow man and attend upon him. It is their mission to clear his ground and trees of insects which would otherwise destroy his fruit and grain. What would the country be without its birds? Their innocent notes gladden the ear, and their beautiful forms and plumage delight the eye. A pair of robins have been known to consume two thousand caterpillars in one week; and what an amount of service to that farm was that single week's work! The farmer who shoots the small birds that confidingly surround his dwelling, errs both in economy and benevolence. We speak not of the hawk which devours the chickens, or of the king-bird which swallows the bees; let him use his shot on them if he will. What if the songsters take tithe of the ripened produce of field and garden; it is nothing but their due. They present their *bills* some months after the labor was performed, and are fully entitled to their living. Honesty in this, as well as in other matters, is always the best policy; and it has invariably been found that the farmer who encourages, instead of repels, the visits of these tiny workmen, is more than repaid for his forbearance.

Electro-Magnetic Battery.—Everything connected with telegraphs is at this moment considered a legitimate subject of interest. Accordingly, Mr. L. B. Swan, of Rochester, has discovered a new solution for the Galvanic Battery, which promises a saving of seventy-five per cent. in the materials used by telegraph companies, independent of its saving labor and time. The solution produces an electric and galvanic current of uniform power and intensity, without the rapid decomposition of the metals and acids hitherto unavoidable. The solution discovered does not act chemically on the mercurial amalgam, and during a trial test by Mr. Barnes, the operator at Rochester, of forty-five days, this solution was used without alteration, or fresh amalgam or acids, and without perceptible destruction of mercury or zinc.

Cloves.—Cloves are the unopened flowers of a small evergreen tree that resembles in appearance the laurel and the bay. It is a native of the Molucca or Spice Islands, but has been carried to all the warmer parts of the world, and is largely cultivated in the tropical regions of America. The flowers are small in size, and grow in large numbers, in clusters at the very end of the branches. The cloves we use are the flowers gathered before they have opened, and whilst they are still green. After being gathered, they are smoked by a wood fire, and then dried in the sun. Each clove consists of two parts, a round head, which is the four petals or leaves of the flowers rolled up, inclosing a number of small stocks or filaments. The other part of the clove is terminated with four points, and is in fact the flower cup and the unripe seed-vessel.

Splendid Virginia Sheep.—We have seen, says the Richmond *Enquirer*, in the hands of our friend Dr. Funsten, of the State Senate, a beautiful specimen of wool clipped from the fine sheep of the Cotswold breed, owned by Col. J. W. Ware, of the county of Clark. The fleece from one of these splendid sheep weighs over eighteen pounds—has a silky appearance, and is of the finest, softest texture. Some of Col. Ware's "Cotswolds" were winners of the high prizes of the Royal Agricultural Society of England. Col. Ware won every prize for which he contended at the Baltimore Fair last autumn. Having thus beaten all England, and the United States too, for four years in succession, he may fairly claim to have the best flock of sheep in the world.

Shoes by Machinery.—We find by a Bridgewater correspondent, that machinery is rapidly invading the domains of St. Crispin's craft, and that sewing-machines for stitching shoes are any thing but a rarity. An establishment in Abington has six machines in constant use. We are informed that an operator with a machine will stitch in one day more than ten times the amount usually accomplished by a stitcher, and that therefore the cost is very materially reduced.

How to Judge Cattle.—In all domestic animals, the skin or hide forms one of the best means by which to estimate their fattening properties. In the handle of oxen, if the hide be found soft and silky to the touch, it affords a proof of tendency to take meat. A beast having a perfect touch will have a thick, loose skin, floating, as it were, on a layer of soft fat, yielding to the

slightest pressure, and springing back towards the finger like a piece of soft leather. Such a skin will be usually covered with an abundance of soft, glossy hair, feeling like a bed of moss, and hence it is ever termed a mossy skin. But a thick-set, hard, short hair always handles hard, and indicates a hard feeder.—*N. Y. Farmer.*

IMPROVEMENT IN THE LOOM.—Measures have been taken by E. W. Nichols, of Worcester, to secure a patent for a new improvement in looms, which consists in a self-acting contrivance for regulating the friction which is given to the warp beam for the purpose of producing tension on the warp, whereby the said tension is made to act uniformly at all times, whatever quantity of yarn there may be on the beam.

HAIR RESTORATIVE.—An English perruquier is said to have invented a real mechanical hair restorer. It consists of a machine containing combs and brushes arranged and conducted so as to produce a galvanic current when used. The teeth of the combs are made of zinc and copper alternately, and continue back to a chamber in the hind part of the comb, in which is placed a cloth saturated with salt water as an excitant. The object of the invention is to excite an electric current when the combs and brushes are used. The brushes are made of fine copper and zinc instead of bristles.

THE CALORIC SHIP ERICSSON.—The friends of progress and improvement cannot but be gratified to learn that the engines of this new ship were fairly set in motion on the 15th of December, and performed admirably. The wheels made about five revolutions per minute while the vessel was made fast to the dock, which is set down as equal to ten or twelve revolutions with the vessel under weigh. The experiment of working a vessel with hot air, with the smallest amount of coal, simple machinery and no danger of explosion, thus far may be said to be successful. The Caloric Ship will shortly make a trial trip, and thoroughly solve the great problem of a new motor.

USEFUL INVENTION.—A patent has been taken out by Mr. Sewall, of New-London, Conn., for a method of constructing window sashes, and fixing the glass therein without putty. Heretofore, when a pane of glass was broken, a glazier should be immediately summoned, who in removing the hard putty frequently damaged the properties of the sash; but by this new arrangement, any one can remove the broken pane of glass and replace it with a whole one, by merely turning a small screw inside the sash, which, when unclosed, detaches the bars of the sash which hold the glass against small strips of India rubber. As a sash constructed on this plan is subject to no chiselling by the putty knife, it may remain a permanent fixture for years, and may be more highly ornamented. His invention will prove highly advantageous in the construction of hot-houses, light-houses, etc.—*Exch.*

CALENDAR CLOCK.—Mr. I. H. Hawes has just patented a very ingenious clock which will run for one year without winding or setting. It is also a very correct time-piece; its calendar gives the month, day of the week, and the year. For the months having only 30 days it denotes such, while for those of 31, 28, or 29, it points equally correct. The machinery of the clock is simple, but accurate.

A NOVEL INVENTION.—The *Cincinnati Gazette* informs us of a mechanic in Ohio City having invented a machine to propel steamboats without steam! It is said to be on the principle of an air gun. By pumps and valves he produces a vacuum on one side of his cylinder head all the time, and the pressure of the atmosphere makes it go. If successful, this invention will beat all that Ericsson or Etzler ever dreamed of. When we know more about it, our readers shall know more.

EXHIBITION OF WORKS OF INDUSTRY AT WASHINGTON.—The first Exhibition of the Metropolitan Mechanics' Institute will be opened at Washington on the 24th of next February, (1853.) It is to be held in the new and splendid Hall of the east wing of the Patent Office, which is 275 feet long, and 70 feet wide. The mechanics from all parts of the Union are invited to exhibit their industrial products. All articles deposited for competition must be of American production. A steam-engine will be in operation for driving the machinery. The Corresponding Secretary is Charles F. Stansbury.

TO THAW OUT A PUMP.—Take a half-inch lead pipe, put a funnel in one end, and set the other on the ice in the pump. Now pour boiling water in the funnel, and the pipe will settle rapidly down through the ice. Now, having drilled a hole through the mass, hot water will soon enlarge it so your pump-rod will move and raise the water from below, which will melt away the obstruction.

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CHILLICOTHE, OHIO, Tuesday, April 13th, 1852.

MESSRS. STEARNS & MARVIN—Gentlemen: Yours of the 5th is at hand. In reply, every Safe in the fire, except yours, has proved good for nothing. I lost a large Safe—it was perfectly destroyed; but in the small Salamander I bought from you, nothing was injured.

Your obedient Servant, W. T. CLEMSON.

The above letter shows that in a real hot fire RICH'S SALAMANDERS are the only Safes to be depended upon. In the Pearl street fire, eleven Safes, of different makers, were totally destroyed, Rich's Safe alone bidding defiance to the flames, preserving notes, bonds, and mortgages, to the value of $100,000. The Chillicothe fire is a parallel case—every Safe but Rich's is destroyed. These repeated occurrences prove incontestibly that Wilder's Patent Salamander, with Rich's improvement, are the best Safes made in the United States, or in the whole world. They can be had at the depot, No. 146 Water Street, and at the Factory, corner of St. Mark's Place and Avenue A, New-York. STEARNS & MARVIN.

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